

Review article

# Comparative Study of Efficiency of Sharia Bank and Conventional Bank with Data Envelopment Analysis Method

I Gusti Ayu Putu Jayanthi Prihartini<sup>1</sup>, Henny Rahyuda<sup>2</sup>

<sup>1</sup>Student of Postgraduate Master Program in Management, Udayana University, Indonesia

<sup>2</sup>Lecturer of Faculty of Economics and Business, Udayana University, Indonesia

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**Abstract** - Efficiency is an indicator used to measure the overall performance of a bank's activities. A bank is said to be efficient if it is able to produce predetermined targets with minimal costs. Banking efficiency is an indicator in measuring the overall performance of banking activities. The purpose of this study is to determine: (1) differences in capital adequacy in Sharia banks and conventional banks; (2) differences in liquidity in Sharia banks and conventional banks; (3) differences in asset quality in Sharia banks and conventional banks; (4) differences in efficiency between Sharia banks and conventional banks. The data used in this study is quantitative data for the 2015-2019 period, which is sourced from the annual financial reports published by companies listed on the Indonesia Stock Exchange. This research uses Data Envelopment Analysis (DEA) analysis technique and Paired Sample T-Test with Wilcoxon test. The results show that there is no difference between capital adequacy and liquidity between Sharia banks and conventional banks. While there are differences in asset quality, Bank efficiency seen from the capital adequacy and liquidity of Sharia banks is more efficient, while the variables of asset quality and operational efficiency ratio conventional banks are more efficient.

**Keywords** - Bank Efficiency, Capital Adequacy Ratio, Non-Performing Loans, Loan to Deposit Ratio

## I. INTRODUCTION

(Efficiency is the relationship or comparison between the output factors (output) of goods and services with scarce inputs in a work unit, or the determination of the way (effort, work) in doing something (by not wasting time, effort, cost). Banks are said to achieve scale efficiency when the bank concerned is able to operate on a constant return to scale, while coverage efficiency is achieved when the bank is able to operate in diversified locations. Specialized literature highlights bank efficiency as an important issue. Economic growth, financial stability, and resource allocation can

increase when bank efficiency increases (Hernández, 2019). Efficiency in the banking sector is one of the performance parameters that are quite popular, widely used as an answer to the difficulty of calculating bank performance measures (Hosen and Muhari, 2013).

The efficiency of the banking industry has always been of particular concern to policymakers and researchers around the world because banks play a very important role in the development prospects of every country. This interest has grown over the last two decades, especially since the global financial crisis. When assessing bank development prospects, both researchers and managers rely on economic theory to measure and compare efficiency between banks (Nguyen, 2020).

Conventional banks are banks that in their activities provide services in traffic, while Sharia banks are banks which, in their activities, both in raising funds and in the context of distributing funds, provide and impose rewards on the basis of sharia principles, namely buying and selling and profit-sharing. The first principle relates to the growth of funds deposited by customers in the bank. Sharia banks do not apply the interest system but rather apply the profit-sharing system. In conventional banks, money usually grows from the interest given by the bank. Principles related to value and Sharia banks tend not to be value-free. This means only investing in halal businesses, according to Sharia teachings. Meanwhile, conventional banks hold the principle of free value. This means that conventional banks are free from religious values so that they can carry out any roles and activities as long as they generate profits and do not violate the applicable rules of state financial institutions such as OJK and Bank Indonesia. Principles related to the view on money. Sharia banks consider money as part of a medium of exchange, not something that can be traded. Sharia banks think that money can be exchanged in other forms as needed. Meanwhile, conventional banks treat money as goods that can be traded (OJK, 2021).



Competition in the banking world at this time is getting tighter due to the increasingly advanced domestic banking business so that every banking business tries to make optimal use of its funds and technology and can realize efficiency and effectiveness in terms of production, consumption, and distribution, which in the end will increase the company's competitiveness (Rezina et al., 2020). The CAR ratio is a capital ratio that shows the bank's ability to provide funds for business development purposes and accommodate the risk of loss of funds caused by bank operations. CAR shows the extent to which the decline in bank assets can still be covered by available bank equity. CAR is the main indicator of bank stability and security, and sufficient capital can effectively protect banks from failure due to absorption of losses (Hadjixenophontos and Christodoulou-volos, 2018).

The Liquidity to deposit ratio is a reflection of the bank in extending the credit being disbursed. The greater the distribution of funds in the form of financing and credit relative to public deposits in a bank, the consequence is the greater the risk borne by the bank concerned (Buchory, 2014). Liquidity risk can arise from the fundamental condition of banks in transforming their short-term deposits into long-term loans (Ogilo and Leonard, 2015). Non-Performing Loans arise because the funds provided in the form of credit do not return on time. Non-performing loans are loans where the debtor is unable to meet the requirements that have been previously agreed upon, for example, regarding interest payments, repayment of loan principal, increasing collateral. To maintain a market with intense competition, they need to take effective steps to control NPL, which can have a progressive impact. On the financial performance of conventional banks and Sharia banks (Rezina et al., 2020).

Performance efficiency measurement can be done with efficiency ratio, namely by calculating the ratio of Operating Costs to Operating Income. Based on Bank Indonesia regulations, a Bank is categorized as inefficiency if the operating efficiency ratio reaches a value of 80% or more. Measurement of efficiency is to enable managers to benchmark bank performance and define areas of inefficiency for future improvement (Othman et al., 2016). The main objective of conventional banks is to maximize profits, and therefore conventional banks concentrate more on increasing their profits rather than improving people's welfare. Regarding the Sharia banking sector, Sharia banks have two types of objectives; Initially, Sharia banks were also more focused on maximizing the welfare of each community's standard of living rather than maximizing their profits (Dodoev, 2018). The purpose of this study is to determine: (1) To determine the differences in capital adequacy in Sharia banks and conventional banks; (2) To determine the difference in liquidity in Sharia banks and conventional banks; (3) To determine the difference in asset quality in Sharia banks and conventional banks; (4) To determine the difference in efficiency between Sharia banks and conventional banks in 2015-2019.r.

## **II. LITERATURE REVIEW AND HYPOTHESIS**

### **A. Efficiency**

Efficiency is defined as a measure of effectiveness resulting in the minimization of wasted time, effort, and skills. From the company's point of view, there are three kinds of efficiency: Technical Efficiency, Allocative Efficiency, and Economic Efficiency. Economies of scale can be achieved when output can be doubled at a cost (cost per unit) of less than double or companies that produce at economies of scale, when each additional production, production costs actually decrease so that in the end it leads to an efficient condition. (Pindyck, Robert S. and Daniel L. Rubinfeld, 2007).

### **B. Bank Efficiency**

The proximity of banking institutions to the best practice frontier is one way of considering how efficient a bank is. In the last few decades, a lot of literature has emerged, which aims to study banking performance using different efficiency approaches. The literature has also analyzed performance in the banking industry from various perspectives, including technical efficiency (Miller and Noulas, 1996), X. scale and efficiency (Carbo et al., 2002), allocative efficiency (Sathye, 2001), and cost-efficiency. And profits (Prior, 2003; Ray and Das, 2010).

This study of bank efficiency is very important because it describes it as an area where macroeconomic and environmental variables are growing more and more similar to the international scenario. They focus on the relationship between efficiency and market power (Williams, 2012); the relative efficiency of large and small banks (Chortareas et al., 2011); the influence of shareholders versus stakeholders on performance (Jiménez-Hernández et al., 2019)

### **C. Efficiency Measurement**

Research conducted by Othman et al. (2016) stated that the efficiency of a company consists of four types, namely: first, technical efficiency (TE), which is global efficiency in measuring the bank's ability to produce actual output with fewer inputs, or fewer resources used to indicate higher efficiency. Second, scale efficiency (SE) refers to the optimal level of activity volume where inefficiency can arise if goods or services are produced above or below the optimal level resulting in additional fixed costs. Third, price efficiency (PE), where banks can increase their efficiency if they can buy inputs (human resources and materials) at lower prices without sacrificing quality. Fourth, allocative efficiency (AE) measures the optimal mix of several inputs to produce a product or service, such as banks entering automatic teller machines (ATM) and internet banking for capital-labor exchange to improve efficiency.

**Differences between Conventional Banks and Sharia Banks**

Through Law Number 10 of 1998 concerning Banking, Banking in Indonesia adheres to Dual System Banking (conventional banks and Sharia banks).

**Table 1. Difference between Sharia Banks and Conventional Banks**

<b>Conventional bank</b>	<b>Sharia bank</b>
Investment does not consider halal or haram as long as the project is financed profitably.	Investment is only for halal and profitable projects and products.
Return, which is paid to depositors of funds and returns received from user customers in the form of interest.	Return, which is paid or received, comes from profit sharing or other income-based on sharia principles.
The agreement uses positive law.	The agreement is made in the form of a contract in accordance with Sharia law
Financing orientation, to gain profit on borrowed funds	The financing orientation, not only for profit but also falah oriented, is oriented to the welfare of the community.
The relationship between the bank and the customer is the debtor and creditor	The relationship between the bank and the customer is a partner.
The supervisory board consists of BI, Bapepam, and Commissioners	The supervisory board consists of BI, Bapepam, Commissioners, and the Sharia Supervisory Board.
Settlement of disputes through local state courts.	Dispute resolution is sought through deliberation between the bank and the customer through a religious court.

**D. Data Envelopment Analysis**

Data Envelopment Analysis (DEA) is a non-parametric method that produces a production frontier to identify units that are used as references that can help to find causes and solutions for inefficiencies. By analyzing banking efficiency based on the DEA model, it can be seen the inputs and/or outputs that cause banks to become inefficient

**E. Previous Research and Hypothesis**

Jaffar and Manarvi (2011) found that Sharia banks with capital adequacy performed well. Capital Adequacy Ratio is used to measure capital adequacy to cover the possibility of failure in lending. CAR is the level of the bank's ability to bear the risk of any risky productive asset credit; the higher the CAR, the better the quality.

CAR is a capital adequacy ratio that is useful to accommodate the risk of loss that may be faced by the bank. Meanwhile, to see the performance in generating profits by analyzing the profitability ratios.

The profitability ratio is a ratio that measures the company's ability to generate profits at a certain level of sales, assets, and share capital (Ade, 2020).

The increase in non-performing loans makes operating income from lending is very small because the interest that banks should receive from debtors is not fully received. To minimize the risk of non-performing loans, banks provide funds for business development purposes and accommodate the risk of loss of funds caused by bank operations called the Capital Adequacy Ratio (CAR) (Ali, 2004: 264). CAR is a capital adequacy ratio that serves to accommodate the risk of loss that may be faced by banks (Barus and Eric, 2016). The higher the CAR, the greater the bank's ability to minimize credit risk that occurs, meaning that the greater the bank is able to cover the credit risk that occurs with the number of reserve funds obtained from the ratio of capital and Risk-Weighted Assets (RWA). CAR is a bank's capital which is also an indicator of a bank's health based on the provisions of BI no. 13/1 / PBI2011 (Yulianti et al.,2018).

One of the qualities of financing or credit is influenced by how big the Loan to Deposit Ratio (LDR) is achieved by the bank. Good quality of financing or credit will not exceed the LDR limit that has been determined by Bank Indonesia. Based on Bank Indonesia Regulation Number 15/7/PBI/2013 concerning Statutory Reserves for Commercial Banks at Bank Indonesia in Rupiah and Foreign Exchange, the LDR limit is 78% to 92%. The LDR ratio will affect the effectiveness of bank lending channels by changing the condition of bank asset and fund management (Park et al., 2012).

Loan to Deposit Ratio (LDR) is a ratio that measures the composition of the loan amount compared to the number of public funds and capital used (Kasmir, 2012). The LDR states the extent to which the bank's ability to repay depositors' withdrawn funds is based on the credit provided as a source of liquidity. The higher the LDR of a bank, the higher the possibility of credibility problems because this ratio indicates one of the bank's liquidity ratings.

Non-performing loans (NPL) Non-performing loans are described as situations where credit approval is a risk of failure and even tends to lead to potential losses. Non-performing loans or commonly referred to as non-performing creditors, can be measured based on the value of Non-Performing Loans (NPL) in percentage. NPL is a ratio that compares total non-performing loans with total loans disbursed as a percentage. NPL can be used as an indicator of credit risk, where the lower the NPL ratio, the lower the credit level that occurs (Ali, 2004). NPL shows the ability of bank management to manage non-performing loans provided by banks, so the higher the NPL, the worse the quality of bank credit which causes the number of non-performing loans. NPL can be influenced by three things, namely bank internal factors, debtor internal factors, and non-bank and debtor external factors. (Yulianti et al. 2018).

Through Bank Indonesia Regulation No. 14 / 26 / PBI / 2012 concerning Business Activities and Office Networks

Based on Bank Core Capital, Bank Indonesia determines that the achievement of bank efficiency is measured, among others, through Operating Income and Net Interest Margin (NIM). The larger the operating efficiency ratio in the BPR will certainly show inefficiency in carrying out its business activities. Unlike the NIM, the higher the NIM value, the more efficient it is in carrying out its business activities

The operating efficiency ratio is often used as a tool to measure efficiency. Financial performance will depend on the maximum or minimum operational costs incurred to obtain operating income. The minimum costs incurred to obtain operating income show that the company is increasingly efficient. BOPO is a comparison between operational costs and operating income (Ali, 2020). This ratio is often referred to as the efficiency ratio, which is used to measure the ability of bank management to control operational costs against operating income. The smaller this ratio means, the more efficient the operational costs incurred by the bank concerned so that the possibility of a bank is in a less problematic condition. The operating efficiency ratio shows the operational risk borne by the bank. Operational risk occurs due to uncertainty about the bank's business, including the possibility of operational losses if there is a decrease in profit which is influenced by the bank's operational cost structure and the possibility of failure of new services and products offered (Kusmadi, 2018). The lower the BOPO ratio means the better the performance of the BPR. This defines that the company is more efficient in using its resources to carry out its operational activities. Stated that the operating efficiency ratio is a comparison between operational costs and operating income (Suardana et al., 2018).

Based on previous research and the conceptual framework in Fig. 1, then the hypothesis in this study are:

H1: There is a difference in capital adequacy between Sharia banks and conventional banks

H2: There is a difference in liquidity between Sharia banks and conventional banks.

H3: There is a difference in asset quality between Sharia banks and conventional banks.

H4: There is a difference in efficiency between Sharia banks and conventional banks

### III. METHOD

This study uses a comparative research approach, which is a comparative study. This study was conducted to compare the Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), efficiency between Sharia banks and conventional banks. The data used in this study is quantitative data for the 2015-2019 period. The data is secondary data sourced from the Indonesia Stock Exchange website. The source of data used in this study is the annual financial report. Use of financial report data published by companies listed on the Indonesia Stock Exchange and the Indonesia Capital Market Directory. This research uses paired t-test or paired t-test, Data Envelopment Analysis (DEA), and Wilcoxon test.

## IV. RESULT

### A. Normality Test

The data used in this study is data sourced from the company's annual financial statements for the period 2015 to 2019. Based on data from the company's annual financial statements, it can be calculated that the financial ratios used in this study are the Capital Adequacy Ratio, Liquidity, Asset Quality (Non-Performing Loans), and Cost Efficiency (Operating Expenses to Operating Income)

Table 5. 1 Normality Test between Variables in Sharia Banks and Conventional Banks

Bank	Signification (%)			
	CAR	LDR	NPL	BOPO
Conventional bank	0,006	0,001	0,000	0,029
Sharia bank	0,001	0,066	0,128	0,328

Source: Data Normality Test

The test results in Table 5.1 explain that the Asymp. Value. Sig. (2-tailed) which is greater than 0.05, then the data is said to be normally distributed. The results of this analysis indicate that the CAR variable is not normally distributed because the significance value is below 0.05, namely conventional banks at 0.006 and Sharia banks at 0.001. In the NPL variable, the significance result shows a value of 0.000 in conventional banks and 0.128 in conventional banks, where the significant value in Sharia banks is greater than the significance level but not with conventional banks, which means that the NPL variable is not normally distributed. Table 5.1 explains the results of the significance of the LDR variable in conventional banks, which is 0.001, and in Sharia banks, which is 0.066; the results show that the data is not normally distributed because one of the bank variables is not normally distributed. The results of the significance of the operating efficiency ratio variable in conventional banks are 0.029, and in Sharia, banks are 0.328. The results show that the data is not normally distributed because one of the bank variables is not normally distributed.

### B. Test Method Data Envelopment Analysis (DEA)

Based on the research results, it is known that the DEA test on the variables of capital adequacy, asset quality, liquidity, and efficiency between Sharia banks and conventional banks is as follows:

Table 5. 2 Average Bank Efficiency Value

No	Bank Name	Bank Efficiency	
		Sharia bank	Conventional bank
		Percentage (%)	
1	BCA	89,38	59,90
2	BRI	94,52	68,60
3	BNI	86,15	72,70
4	Mandiri	91,48	72,06
5	Mega	92,88	80,14
6		99,97	95,67
	Mean	92,40	74,85

Source: DEA Test Results, 2021

Based on table 5.2 shows that the average efficiency of Sharia banks is 92.40% and conventional banks are 74.85%, which means that the efficiency of conventional banks is better than Sharia banks, the efficiency value is close to 100%, the bank is said to be inefficient.

**C. Wilcoxon test**

Based on the research results, it is known that the DEA test on the variables of capital adequacy, asset quality, liquidity, and efficiency between sharia banks and conventional banks is as follows:

**Table 5.3 Wilcoxon Test Results for Variable Capital Adequacy Ratio**

Test Statistics <sup>a</sup>	
	Sharia_Bank - Conventional_Bank
Z	-.072 <sup>b</sup>
Asymp. Sig. (2-tailed)	.943
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on Table 5.3, it is known that the SPSS test results are Z value of -0.072 with a significance level of 0.943, which is greater than 0.05, which means that there is no significant difference in capital adequacy (CAR) between sharia banks and conventional banks on the Indonesia Stock Exchange in 2015- 2019, Hypothesis 1 is rejected.

**Table 5.4 Wilcoxon Test Results from Variable Loan to Deposit Ratio**

Test Statistics <sup>a</sup>	
	Sharia_Bank - Conventional_Bank
Z	-1.409 <sup>b</sup>
Asymp. Sig. (2-tailed)	.159
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on Table 5.4, the results of the SPSS test are known, namely the Z value of -1.409 with a significance level of 0.159 which is greater than 0.05, which means that there is no significant difference in Liquidity/Loan to Deposit Ratio (LDR) between Sharia banks and conventional banks on the Indonesia Stock Exchange. In 2015-2019, Hypothesis 2 was rejected.

**Table 5.5 Wilcoxon Test Results for Variable Non-Performing Loans**

Test Statistics <sup>a</sup>	
	Sharia_Bank - Conventional_Bank
Z	-4.252 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Source: Appendix 4 SPSS Data Processing Results, 2021

Based on Table 5.5, it is known that the SPSS test results are Z value of -4.252 with a significance level of 0.000 which is smaller than 0.05, which means that there is a difference in Asset Quality/Non-Performing Loans (NPL) between Sharia banks and conventional banks on the Indonesia Stock Exchange in 2015 -2019, Hypothesis 3 accepted

**Table 5.6 Wilcoxon Test Results for Variable Efficiency**

Test Statistics <sup>a</sup>	
	Sharia_Bank - Conventional_Bank
Z	-4.782 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Source: Appendix 4 SPSS Data Processing Results, 2021

**V. DISCUSSION**

The Wilcoxon test results explain that there is no significant difference between the capital adequacy variable and the CAR proxy between Sharia banks and conventional banks on the Indonesia Stock Exchange in 2015-2019. CAR is a capital ratio that shows the bank's ability to provide funds for business development purposes and accommodate the risk of loss of funds caused by bank operations. CAR shows the extent to which the decline in bank assets can still be covered by available bank equity (Taswan, 2010). The higher the CAR, the more capital the bank has to cover the decline in assets. There is no difference in the capital adequacy ratios owned by Sharia banks and conventional banks, where conventional banks and Sharia banks are able to protect depositors and encourage stability and efficiency of their financial system, capital adequacy is useful to accommodate the risk of loss that may be faced by conventional and non-conventional banks. Sharia.

The Wilcoxon test results explain that there is no significant difference between the LDR of conventional banks and the LDR of Sharia banks listed on the Indonesia Stock Exchange in 2015-2019. Based on Bank Indonesia Regulation Number 15/7/PBI/2013 concerning Statutory Reserves for Commercial Banks at Bank Indonesia in Rupiah and Foreign Exchange, the LDR limit is 78% to 92%. The LDR ratio will affect the effectiveness of bank lending channels by changing the condition of bank asset and fund management (Park et al., 2012). This means that bank management will utilize its assets and funds to be re-managed in the form of a credit to customers. In addition, the LDR is a reflection of the bank in extending the credit being disbursed (Buchory, 2014). The greater the distribution of funds in the form of financing and credit relative to public deposits in a bank, the consequence is the greater the risk borne by the bank concerned. This condition characterizes the bank experiencing difficulties in meeting the demands of customers who wish to withdraw their funds in a certain amount at a certain time. This will have a bad impact on the bank because it will trigger a reduction in the number of

funds raised due to the loss of customer trust. Liquidity risk can arise from the fundamental condition of banks in transforming their short-term deposits into long-term loans (Ogilo and Leonard, 2015).

The Wilcoxon test results explain that the asset quality variable with the NPL proxy there is a significant difference between Sharia banks and conventional banks on the Indonesia Stock Exchange in 2015-2019. Financial institutions in almost every country in the world face some risk of bad credit; it is, however, prudent that these institutions introduce monitoring mechanisms to follow up on borrower activities. McNulty et al. (2001) noted that NPLs are considered significant for individual bank performance and economic-financial regulation (Rezana et al., 2020). The reserve ratios and capital requirements for these banks are different, which may be the reason for the differences. However, regardless of the situation, the two bank criteria are experiencing difficulties due to NPLs. So, to maintain a market with intense competition, they need to take effective steps to control NPL, which can have a progressive impact on the financial performance of conventional banks and Sharia banks (Rezina et al., 2020).

The results of the Data Analyst Method Test and the Wilcoxon test explain that conventional banks are more efficient than Sharia banks. The BOPO ratio is used to assess the level of efficiency and ability of a bank in carrying out its operations, namely the percentage comparison between operating costs and operating income. So if the higher this ratio indicates the company's condition is not good because, the higher the cost, the bank becomes more inefficient so that changes in operating profit are smaller. A bank is said to achieve efficiency in scale when the bank is able to operate in a constant scale of returns, while coverage efficiency is achieved when the bank is able to operate in a diversified location. Allocation efficiency is achieved when the bank is able to determine various outputs that maximize profits, while technical efficiency basically states the relationship between inputs and outputs in a production process (Berger and Mester, 2006).

## VI. CONCLUSION

Based on the discussion described in the previous chapter, the following conclusions can be drawn: Capital Adequacy and Bank Liquidity there is no significant difference between Conventional Banks and Sharia Banks on the Indonesia Stock Exchange in the 2015-2019 period. This shows that both banks have the ability to guarantee or cover any risk of loss that may arise and Liquidity This shows, the bank has implemented the principle of prudence in lending so that credit risk that may arise can be reduced so that profitability is maintained and has an impact on the bank's ability to maintain good liquidity.

There are differences in asset quality or Non-Performing Loans/NPLs between Sharia banks and conventional banks on the Indonesia Stock Exchange in the 2015-2019 period. This shows, the greater the NPL, the higher the level of non-performing loans, resulting in a decrease in income, which

affects the performance, the soundness of the bank, and the continuity of the bank. Conventional banks are more efficient than Sharia banks where the value of efficiency. The ratio of operating income divided by operating income, the higher the efficiency ratio indicates the condition of the company is not good, the higher the cost, the bank becomes inefficient so that the operating profit is getting smaller.

Judging from the efficiency of capital adequacy and liquidity, Sharia banks are better than Sharia banks, which means that banks are able to regulate capital and financing. Meanwhile, on the asset quality variable, conventional banks are more efficient than Sharia banks because banks are able to manage credit financing well

Suggestions that can be given based on the results of research conducted for further researchers to use other external factors that can affect bank efficiencies, such as inflation, interest rates, and unemployment. It is also recommended to use a longer research period and more samples to get better results from this study.

Suggestions that can be given based on the results of research conducted for future researchers so that in further studies, an increase in the number of variables (i.e., the impact of sharing credit information, demographic attributes of credit officers) can be used to explain the model.

## REFERENCES

### Books:

- [1] Robert Pindyck & Daniel L. Rubinfeld., Mikroekonomi edisi keenam. Indeks: Jakarta., (2007).
- [2] Undang-Undang Nomor 10 Tahun 1998 tentang perbankan
- [3] Kasmir., Analisis Laporan Keuangan. Jakarta : PT. Raja Grafindo Persada., (2012).
- [4] Peraturan Bank Indonesia No.14 / 26 / PBI / 2012 tentang Kegiatan Usaha dan Jaringan Kantor Berdasarkan Modal Inti Bank.

### Journal Papers:

- [1] Hernández Jiménez-, I., Picazo-Tadeo, A.J. and Sáez-Fernández, F.J., Are Lac cooperative and commercial banks so different in their management of non-performing loans?, *Annals of Public and Cooperative Economics*, 90(3) (2019) 419-440
- [2] Nguyen, P.H. and Pham, D.T.B., The cost efficiency of Vietnamese banks – the difference between DEA and SFA, *Journal of Economics and Development*, 22(2) (2020) 209-227., <https://doi.org/10.1108/JED-12-2019-0075>
- [3] Hadjixenophontos, A. and Christodoulou-Volos, C., Financial crisis and capital adequacy ratio: a case study for Cypriot commercial banks, *Journal of Applied Finance and Banking*, 8(3) (2018) 87-109.
- [4] Ogilo, Fredrick and Leonard Oscar Mugenyah., Determinants of Liquidity Risk Of Commercial Banks in Kenya. *The International Journal of Business and Management*, 3(9) (2015) ISSN: 2321-8916. School of Business University of Nairobi; Kenya
- [5] HOSEN, Muhamad Nadratuzzaman, Syafaat MUHARI Efficiency of the Sharia Rural Bank in Indonesia Lead to Modified Camel. *International Journal of Academic Research in Economics and Management Sciences* 2(5). DOI:10.6007/IJAREMS/v2-i5/298
- [6] Komaryatin, Nurul., Analisis Efisiensi Teknis Industri BPR di Eks.Karisidenan Pati. Tesis S2 Pasca Sarjana Uniiversitas Diponegoro., (2006).
- [7] DODOEV, Khasanjon. Comparative Analysis of Islamic and Conventional Banks in CAMEL Model in Case of Malaysia. *Global Journal of Management And Business Research*, [S.I.], Nov. 2018. ISSN 2249-4588. Available at: <<https://www.journalofbusiness.org/index.php/GJMBR/article/view/2608>>. Date accessed: 21 May 2021.

- [8] Rezina, Sonia, Rubaiyat Shaimom Chowdhury, Nusrat Jahan.. Non-Performing Loan in Bangladesh: A Comparative Study on the Islamic Banks and Conventional Banks. *Indian Journal of Finance and Banking*. 4(1)(2020) ISSN 2574-6081.E-ISSN 2574-609X Published by Centre for Research on Islamic Banking & Finance and Business, USA
- [9] Taswan., *Manajemen Perbankan, Konsep, Teknik, dan Aplikasi*. Edisi Kedua. Yogyakarta : UPP STIM YKPN., (2010)
- [10] Buchory, Henry Achmad., *Analysis of the Effect of Capital, Credit Risk, and Profitability to Implementation Banking Intermediation Function (Study On Regional Development Bank All Over Indonesia Year 2012)*. *International Journal of Business, Economics and Law*. 4 (2014) ISSN 2289-1552.
- [11] Ogilo, Fredrick and Leonard Oscar Mugenyah., *Determinants of Liquidity Risk Of Commercial Banks in Kenya*. *The International Journal of Business and Management*, 3(9) (2015) ISSN: 2321-8916. School of Business University of Nairobi; Kenya
- [12] Othman, F. M., Mohd-Zamil, N. A., Rasid, S. Z. A., Vakilbashi, A., & Mokhber, M., *Data Envelopment Analysis: A Tool of Measuring Efficiency in Banking Sector*. *International Journal of Economics and Financial Issues*, 6(3) (2016) 911-916
- [13] Miller, S.M. and Noulas, A.G., *The technical efficiency of large bank production*, *Journal of Banking and Finance*, 20(3)(1996) 495-509
- [14] Carbo, S., Gardener, E.P. and Williams, J., *Efficiency in banking: empirical evidence from the savings banks sector*, *The Manchester School*, 70(2) (2002) 204-228
- [15] Sathye, M., *X-efficiency in Australian banking: an empirical investigation*, *Journal of Banking and Finance*, 25(3) (2001) 613-630.
- [16] Prior, D., *Long-and short-run non-parametric cost frontier efficiency: an application to Spanish savings banks*, *Journal of Banking and Finance*, 27(4) (2003) 655-671.
- [17] Ray, S.C. and Das, A., *Distribution of cost and profit efficiency: evidence from Indian banking*, *European Journal of Operational Research*, 201(1) (2010) 297-307
- [18] Williams, J., *Efficiency and market power in Latin American banking*, *Journal of Financial Stability*, 8(4) (2012) 263-276
- [19] Chortareas, G.E., Garza-Garcia, J.G. and Girardone, C., *Banking sector performance in Latin America: market power versus efficiency*, *Review of Development Economics*, 15(2) (2011). 307-325.
- [20] Jaffar, M., & Manarvi, I., *Performance evaluation of Islamic and Conventional Banks in Pakistan*. *Global Journal of Management and Business Research*, 11(1) (2011) 213–220. <https://doi.org/10.5829/idosi.wasj.2012.20.02.2321>
- [21] Ade Irma Suryani., *Effect of Profitability Ratios on Banking Capital Adequacy (study at PT. Bank Rakyat Indonesia Tbk.)*. *International Journal of Science, Technology & Management*, 1(4) (2020) 264-268. <https://doi.org/10.46729/ijstm.v1i4.98>
- [22] Barus, A.C., and Erick., *Analisis Faktor-Faktor yang Mempengaruhi Non Performing Loan Pada Bank Umum di Indonesia*. *Jurnal Wira Ekonomi Mikrosil* 6(2) (2016).
- [23] Ali, M., *Asset Liability Management, Menyiasati Risiko Pasar dan Risiko Operasional dalam Perbankan*. Jakarta: PT. Elex Media Kompetindo Kelompok Gramedia., (2004).
- [24] Yulianti, Eka Aliamin, Ridwan Ibrahim., *Journal of Accounting Research, Organization and Economics*., 1(2) (2018) 205-214
- [25] Park, Hyungeum., Hyunwoo Jun., and Dokyung Lee. *Evaluation on the Usefulness of the Loan to Deposit Ratio Regulation-From the Macprudential Policy Perspective at (2015)*. SEACEN Policy Summit. h:1-24
- [26] Kusmayadi, Dedi. 2018. *Analysis of Effect of Capital Adequacy Ratio, Loan to Deposit Ratio, Non-Performing Loan, Bopo, and Size on Return on Assets in Rural Banks in Indonesia*. *Saudi Journal of Business and Management Studies (SJBMS)*. 3(7) (2018): 786-795. DOI: 10.21276/sjbms.2018.3.7.4
- [27] Suardana, Ida Bagus Raka, I Nengah Dasi Astawa, Luh Kadek Budi Martini. 2018. *Influential Factors towards Return On Assets and Profit Change (Study on all BPR in Bali Province)*. *International Journal of Social Sciences and Humanities*. 2(1), (2018) 105~116e-ISSN: 2550-7001, p-ISSN: 2550-701X. DOI:10.21744/ijssh.v0i0.00v
- [28] Berger, A. N., and Mester, L. J., *Inside the black box: What explains differences in the efficiencies of financial institutions*: *Journal of Banking and Finance*. 21(7) (1997) 895-947.
- [29] Berger, A. N., and Mester, L. J., *Inside the Black Box: What Explains Differences in the Efficiencies of Financial Institutions?*. *SSRN Electronic Journal*, 21(2005) 895-947. <https://doi.org/10.2139/ssrn.138159>.
- [30] Prasetyo, Dwi Agung; Darmayanti, Ni Putu Ayu. *Pengaruh Risiko Kredit, Likuiditas, Kecukupan Modal, Dan Efisiensi Operasional Terhadap Profitabilitas Pada Pt Bpd Bali*. *E-Jurnal Manajemen, [S.L.],4(9) (2015)*. Issn 2302-8912. Available At: <<https://Ojs.Unud.Ac.Id/Index.Php/Maajemen/Article/View/13416>>.