Measuring Efficiency Through The Stochastic Frontier Analysis (SFA) And Data Evelopment Analysis (DEA) Method In Savingsand Loan Cooperations In Jakarta

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Abstract: The aim of this research is to examine the efficiency of savings and loan cooperatives in terms of the number of members, total capital and operational costs and their influence on profits, total assets, loans issued and debt repayment. The two types of savings and loan cooperatives studied were savings and loan cooperatives owned by government employees and savings and loan cooperatives owned by the community. The efficiency of these two types of cooperatives was studied separately and comparatively using the parametric Stochastic Frontier Analysis (SFA) method and the non-parametric Data Development Analysis (DEA) method. Research findings using the SFA method found that the average efficiency value of community-owned cooperatives was greater than savings and loan cooperatives owned by state employees. Meanwhile, the results of research on all cooperatives show that the SFA method provides a higher average efficiency value than the DEA method. The research findings show that the efficiency value of using the SFA method is higher than the DEA method and that community-owned savings and loan cooperatives are more efficient than cooperatives owned by civil servants.
Keywords: Efficiency, SFA, DEA

I.   INTRODUCTION.

Savings and Loans Cooperatives have the same goals and characteristics as other financial organizations such as Rural Banks (BPR) and conventional banks. Savings and Loans Cooperatives also have a main goal that must be achieved, namely providing services to their members on an ongoing basis in an effort to develop society. Savings and Loans Cooperatives aim to improve community welfare by providing loans to members and non-members. This is supported by the Minister of Cooperatives that the growth of cooperatives and micro, small and medium enterprises (MSMEs) is increasing from year to year, able to reduce unemployment and poverty in Indonesia.

The total debtors from cooperatives and MSMEs are 10.04 million people. The rapid development of Savings and Loans Cooperatives can be seen from the number of cooperatives up to 2022 of 209,488 with an annual growth rate of 3.64 percent, total income of IDR 266,134,619.44 million with an annual growth rate of 4.64 percent and a profit of IDR 17,330,663.92 million at an annual growth rate. amounting to 3.85 percent (Head Office Cooperative, 2022).

However, in practice, cooperatives in Indonesia have not been able to improve their performance to the maximum. Related to this, the government has helped by issuing the Cooperative Law which allows the issuance of Cooperative Capital Letters (SMK) so that cooperatives can compete with Community Financial Institutions (LKM), Rural Banks (BPR) and Sharia People's Banks. Bank Loans (BPRS) (Syafaat Muhari, 2014).

Efficiency is a performance parameter that is quite popularly used to answer various difficulties in performance calculations. Savings and Loans Cooperatives are financial organizations that have risks and cooperatives must be able to minimize the level of risk, so that Savings and Loans Cooperatives need to act rationally in dealing with risk management efficiency problems (Hendar, 2010).

Muslimin Nasution (2008) explains that cooperative performance will be successful if there are control tools or quality indicators for cooperatives, one of which is knowing its efficiency. Evaluation of cooperative efficiency is very important because efficiency is a reflection of cooperative performance which includes profits, total loans, total assets and debt payments, as well as being a factor that must be considered to act in

minimizing the level of risk in its business, operational activities.

The purpose of this study was to measure the efficiency of savings and loan cooperatives owned by civil servants and community-owned savings and loan cooperatives and to compare the efficiency of savings and loan cooperatives using parametric methods (SFA) with non-parametric methods (DEA).

II.   LITERATURE REVIEW
Efficiency

The financial services industry is changing rapidly. Therefore, it is important to determine the efficiency and income of financial institutions. If these institutions become more efficient, the increase in profits, increase in mediation funds and the quality of service for customers will also be better (Berger, 1993). Effectiveness or efficiency has been used in many aspects, for example economics, technology and social sciences (Coelli, 2005). In the economic aspect, efficiency is also used to measure a company. A company is said to be efficient if it produces maximum output with minimal use of input (Kosak & Zajc, 2006).

Basically, efficiency is considered as productivity and is measured by the ratio of input and output (Ngo, 2010). In the financial industry, efficiency is also used in various financial institutions such as insurance companies, Savings and Loans Cooperatives and others. However, a popular financial institution is a banking institution (Kosak & Zajc, 2006). The efficiency of financial institutions has become a very important issue in economic transition (Jemric & Vujcic, 2002). The efficiency of financial institutions has been measured in recent decades to manage, supervise and monitor the activities of financial institutions. The financial industry is considered one of the industries that has a direct impact on the economy. Therefore, it is important to assess the level of efficiency of financial institutions in an economy (Kumbhakar & Lovell, 2000).

A study by Coelli (2005) explains that maximum output is achieved from an input level where the Decision-Making Unit (DMU) is considered effective when it is at the limit line and ineffective when it is above or below the limit line.

The concept of efficiency comes from the concept of microeconomics, namely the theory of consumers and producers. The consumer theory tries to maximize utility or satisfaction while the producer theory tries to maximize profits or minimize costs. In producer theory, there is a production frontier line which describes the relationship between input and output from the production process and a production frontier which represents the maximum output from the use of each input. It is a technology used by business or industry (Ascarya, 2009).

According to Berger and Master (1997), there are three concepts of financial institution efficiency. First, cost efficiency is a measure of how close the difference is between actual costs and the best costs of producing the same output under the same conditions. Second, profit efficiency standards indicate the accuracy of measuring actual production profits with the maximum profits that can be achieved at certain output and input price levels. Third, alternative profit efficiency is a measure of the profitability of a financial institution with the maximum possible profit achieved at a certain level of output quantity and input price. In this market situation, financial institutions are assumed to have market power in determining output prices but not in input prices. This is because there are different types of markets. So, the most significant difference between these two methods is the efficiency of alternative profits for determining exogenous variables in achieving maximum profits. In this method the exogenous variable is the output level.

According to Alfred Hanel (1985), economic efficiency can be measured using measures such as efficiency in operations, efforts seen from financial position and business performance. Thoby Mutis (1992) describes five characteristics of cooperative efficiency. First, internal efficiency which is the best comparison between excess costs and actual costs. Second, allocative efficiency, namely efficiency related to the use of resources and funds from all components in the cooperative. Third, external efficiency which shows the efficiency of institutions and individuals outside the cooperative which also indirectly drives efficiency within the cooperative. Fourth, dynamic efficiency, namely efficiency that is usually associated with the level of optimization due to changes in the technology used. Fifth is social efficiency related to the proper use of resources and funds.

Farrell (1957) and Ismail (2010) explained that the efficiency of a company can be assessed based on economic efficiency which consists of several technical factors, namely allocation efficiency, scale efficiency, pure technical efficiency and cost efficiency. Technical efficiency is defined as a company's ability to produce output at a certain level using a minimum number of inputs or at a certain level of input. A company is

said to be efficient if the company has the ability to manage production activities effectively so that it is able to produce output at a maximum level without wasting resources (Kumbhakar & Lovell, 2000).

Efficiency Measurement

Theoretical or empirical evaluation of organizational performance is dominated by the use of frontier methods. In general, this method is divided into parametric and non-parametric. This method also has the same characteristic of using relative efficiency as a measure of performance. Decision Making Unit (DMU) efficiency is defined as the ability to produce maximum output from minimum input, depending on resource constraints and operating environment (Sufian, 2006; Banker, 1984). The method with a parametric approach uses the Stochastic Frontier Analysis (SFA) approach, while the non-parametric approach uses the Data Envelopment Analysis (DEA) approach. The SFA approach assumes a production function that is used to map input and output relationships and calculate economic efficiency, which is then organized into Pure Technical Efficiency (PTE) and Allocative Efficiency (AE) (Fried, 1993).

The strength of this approach is that it is able to control stochastic errors in the econometric estimates. However, the weakness of this approach is the possibility of errors in determining inaccurate production and distribution functions which can cause biased results (Drake & Weyman, 1996). As an alternative, the increasingly popular Data Envelopment Analysis (DEA) method developed by Charnes, Cooper and Rhodes (1978) is used. This approach is often used for efficiency estimation in banking studies. Kedah Data Envelopment Analysis (DEA) uses linear programming procedures to identify empirical products.

DEA compares all similar units by taking several dimensions of output and input into common account. Each unit is considered a decision-making unit that converts inputs into outputs. The DEA method is summarized as the CCR method (Charnes, 1978) and the method developed by Banker, Charnes, and Cooper is summarized as the BCC method (Banker, 1984). Due to the flexibility of DEA and the limitations of the Study data, this Study will use DEA in measuring efficiency.

There are two different ways to measure efficiency, namely parametric and non-parametric (Greene, 1993). According to previous studies, most researchers have used different methods to measure efficiency. For example, financial ratios are used as indicators to measure efficiency (Aigner, 1997). Inefficiency must be measured and compared through production indices obtained from data and statistical tools (Aly, 1993). Efficiency or inefficiency measurements are measurements of the results of studies or data collection systems obtained previously. In general, different efficiency measurement methods depend greatly on the assumptions used to measure or estimate the index (Berger & Humphray, 1991).

Efficiency analysis was developed by Debreu (1951) and Farrell (1957), Berger (1993) and Berger and Humphray (1997) who studied financial services by measuring efficiency using parametric and non-parametric methods. Non-parametric methods include Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH) while parameterization methods include Stochastic Frontier Analysis (SFA), Thick Frontier Approach (TFA) and Distribution Free Approach (DFA).

Various empirical studies on efficiency measurement were carried out using DEA and SFA because these measurement methods are very developed and are most widely used to analyze efficiency in financial institutions, especially in the United States and developing countries. For example, Berger et al. (1993), Berger and Humphrey (1997) and Berger and Mester (1997) have conducted studies to review the efficiency of financial institutions using these two methods. The use of DEA and SEA is also in line with the studies of Istuningsih, (2015), Muhari, (2014), Subandi (2014), Suswandi (2007), Iqbal (2011) in Indonesia, Hamim, (2006) in Malaysia, Yildirim and Philippatos (2003) in central and eastern European countries, Bhattacharya et al. (1997) and Srivastava (1999) in India, Hasan and Marton (2003) in Hungary and Isik and Hassan (2002) in Turkey.

In addition, Berger and Humphray's (1997) study which provided an overview of 130 efficiency studies in financial institutions published up to 1997 found that the estimated level of efficiency varied according to method, context and method specifications. Meanwhile, studies calculating efficiency were also carried out by Nyankomo Marwa and Meshach Aziakpono (2015) in Tanzania Savings and Loans Cooperatives, Huynhnhat Nguyen (2014) in Vietnamese financial institutions, Beccalli, Cesu and Girardone (2006) in European financial institutions, Kablan (2010) in African financial institutions and Tecles and Tabak (2010) in Brazil. Farrell (1957) and Ismail (2010) concluded that the efficiency of a company can be assessed by knowing the level of economic

efficiency which consists of several factors, namely Technical Efficiency (TE), Allocation Efficiency (EA), Scale Efficiency (SE), Pure Technical Efficiency (PTE) and Cost Efficiency (CE).

Measuring the Efficiency of Financial Institutions

Measuring the efficiency of financial institutions such as Savings and Loans Cooperatives can be studied from operations which is the main approach to explain the relationship between input and output. There are two approaches used, namely production and mediation (Freixas & Rochet, 1998). The production approach describes activities as the production of services to savers and borrowers using all factors that can be obtained from production such as labor and physical capital. This approach was initiated by Benston (1965) and Bell and Murphy (1968) who considered financial institutions as financial locations in the production of deposit accounts for depositors and loans. Therefore, this approach defines input as the amount of labor, capital costs, fixed assets and other materials and defines output as the sum of all savings accounts.

According to Freixas, (1998), the intermediary approach is compatible with financial methods where money is collected from depositors and all money lent to borrowers is provided by financial institutions. This is the only output of service to depositors and borrowers. These two approaches describe the activities of financial institutions as intermediaries in channeling money borrowed from depositors (surplus units of production) into money lent to borrowers (deficit units). This approach defines input as financial capital (accumulated deposits and borrowed funds) and defines output as total credit and investment. In this case, the total amount of loans given is generally different from the amount of savings collected. The parameterization measurement results from the mediation approach are not significantly different from the production approach, but this approach has several obstacles in determining savings as output or input.

Saad (2009), states that the production approach is to consider the actions of financial institutions as institutions that provide cost-based products and services to customers using various resources. This approach is used to study cost efficiency by considering the operational costs of a financial institution. The intermediary approach is a financial institution as a financial intermediary that collects funds in the form of savings and provides loans or other assets to obtain income. This approach is used to study organizational efficiency and the economic viability of financial institutions. Berger, (1997) states that the output approach is better in evaluating the efficiency of financial institution branches. Data analysis used the DEA frontier program developed by Zhu et al. (2009) is a mediation approach to calculate the technical efficiency (TE) of a sample of financial institutions obtained through CRS (input-oriented version of DEA).

III. RESEARCH METHODS

Variable measurement

In this research there are 2 variables, namely input variables and output variables. Input variables are members, capital and operational costs. Meanwhile, the output variables are profits, assets, loans and loan repayments. For data analysis purposes, the theoretical framework is as shown in Figure 3.1. Input and output variables were analyzed using parametric (SFA) and non-parametric (DEA) methods. This method is the level that will determine the efficiency value for cooperatives in the Jakarta area. The method used in this research is expected to answer the research objectives presented in Chapter 1.

Profit efficiency method

This method is used to calculate efficiency values by combining input and output variables. The input variables used as independent variables are members, capital, operational costs, assets, loan amounts and debt payments. The output variable used as the dependent variable is profit. According to Greene (1993) explains that with the production frontier method it is possible to predict the relative efficiency of a particular group or company which is obtained from the relationship between production and the evaluated production potential. The Stochastic Frontier method assumes that the output is limited by a stochastic function called the Stochastic Production Frontier. Stochastic Production Frontier is a frontier that describes the maximum output that can be produced from input factors. The output of financial institutions is profit. The CCR method is known as Constant Return to Scale (CRS), which is a comparison of constant output and input values and the addition of comparable input and output values. In the CCR method there is no convexity constraint condition, in contrast to the Banker-Charnes-Cooper (BCC) financial institution method which has a convexity constraint condition. The results of the DEA method which provides a scaled return variable is called the BCC method (Banker, Charnes &

Cooper, 1984), namely by adding convexity conditions for the weight values by entering the limitation method.

The BCC method is also known as Variable Return To Scale (VRS) which is an increase in input and output at different levels. An increase in rate can be in the form of an increase in return to scale (IRS) or it can also be a decreasing return to scale (DRS). Many previous studies have been carried out using DEA analysis, for example in the analysis of the financial institution sector. Sherman and Emas (1985) were the first researchers to use the DEA method to calculate financial institution efficiency scores. Bhattacharya et al. (1997) were the first researchers to use VRS DEA to evaluate the efficiency of commercial financial institutions between 1986 and 1991.

IV.   RESEARCH RESULT

Savings and Loans Cooperative Efficiency Analysis

The results of this data analysis are to determine the results of the F test (significance) and the efficiency value with the SFA and DEA methods. For the efficiency value of the SFA method, the input variable functions as the independent variable, while the output variable functions as the dependent variable. SFA and DEA analysis to determine output efficiency values (profits, assets, credit and debt repayment). The results of the F test, the efficiency values of SFA and DEA (CRS and VRS) can be seen in the table below. There are two types of cooperatives involved, namely Savings and Loans Cooperatives owned by government employees and those owned by the community

Profit Efficiency Analysis of Savings and Loans Cooperatives using the Stochastic Frontier Analysis (SFA) Method
This data analysis technique calculates the efficiency value for each Savings and Loans Cooperative owned by civil servants and owned by the community in Jakarta. This study calculates the value of efficiency using the Stochastic Frontier Analysis (SFA) method. This method is used to evaluate the profit efficiency of Savings and Loan Cooperatives. In this analysis, profit efficiency functions as the dependent variable and members, capital, operating costs and assets, total credit (amount lent), debt repayment function as independent variables. The results of calculations using the SFA method are as follows.

Table 4.1.
Efficiency of Savings and Loan Cooperatives Owned
by Government Agencies with the SFA Method.

Code	Name	Efficiency with SFA (%))
KK01	Soul Hospital Cooperative, Dr. Suharto Heerjan	94.05
KK02	Pelni Hospital Employee Cooperative	65.06
KK03	Prosperous Mandiri Primier Cooperative	74.25
KK04	Perum Peruri Cooperative	84.32
KK05	South Jakarta Ministry of Religion Cooperative	86.71
KK06	Cooperative of Cleaning Officer Mothers	70.52
KK07	Cooperative Secretary General of Education and Culture	99.62
KK08	Indonesian Ministry of Religion Cooperative	76.32
KK09	Primkopal Kolinlamil Cooperative	61.22
KK10	SMA 45 Teachers and Employees Cooperative	98.56
KK11	Archipelagic Bonded Zone Cooperative	64.89
	Amount	875.42
	Average	**79.58**

Source: Calculation results with the Frontier 4.1c Program.

Based on the table above, the profit efficiency value of the Savings and Loans Cooperative whose efficiency value is 90 percent - 100 percent of the 3 cooperatives, namely Dr.

Suharto Heerjan (KK01) 0.9405 (94.05 percent), Secretary General of Education and Culture cooperatives 0.9962 (99.62 percent), SMA 45 Teacher and Employee cooperatives 0.9856 (98.56

percent) and cooperatives This is already in the efficient category. This efficiency is the result of all variables, namely the number of members, the amount of capital, the amount of operating costs, the number of assets, the amount of credit, the repayment of debt which has an efficiency function that has a positive and significant effect on profit efficiency.

Furthermore, in the Savings and Loans Cooperative, the efficiency value of which is 70 percent - 89 percent is quite high and this category of cooperatives is not yet efficient, there are 5 cooperatives, namely the Primier Mandiri Sejahtera Cooperative with an efficiency value of 0.7425 (74.25 percent), the Perum Peruri Cooperative with an efficiency value of 0.8432 (84.32 percent), the efficiency value of the South Jakarta Ministry of Religion Cooperative is 0.8671 (86.71 percent), the efficiency value of the Mabes Cleaning Cooperative is 0.7052 (70.52 percent), and the efficiency value of the Republic of Indonesia Ministry of Religion Cooperative is 0.7632 (76, 32 percent), the results of this efficiency of all

variables, namely the number of members, total capital, total operating costs, total assets, total credit, debt repayment, which has an efficiency function has a positive and significant effect on profit efficiency.

Furthermore, in Savings and Loans Cooperatives whose efficiency value is less than 70 percent, there are 3 cooperatives with low efficiency values in the inefficient category, namely the Pelni Hospital Staff Cooperative with an efficiency value of 0.6506 (65.06 percent). , the Primkopal Kolinlamil Cooperative with an efficiency value of 0.6122 (61.22 percent) and the Nusantara Bonded Zone Cooperative has an efficiency value of 0.6489 (64.89 percent), this efficiency value is from the contribution of the independent variables namely the number of members, the amount of capital, operating costs, total assets, total credit and debt repayment which shows that all variables have an efficiency function that has a positive and significant effect on profit efficiency.

Efficiency of Savings and Loans Cooperatives owned by the general public using the SFA Method

Code	Name	Efficiency with SFA (%))
KM12	SumberJayaCooperative	83.29
KM13	KspKodanoaCooperative	99.95
KM14	SejatiMulyaCooperative	77.71
KM15	SehatiCooperative	87.63
KM16	RawaBadungCooperative	88.87
KM17	WiraKaryaJayaCooperative	92.57
KM18	CegerCooperative	69.38
KM19	TunasJayaCooperative	96.91
KM20	KesejahteraanKaumIbuCooperative	66.69
KM21	KemauanBersamaCooperative	87.91
KM22	MakmurCooperative	66.37
	Amount	**917.28**
	Average	**83.39**

Source: Calculation results with frontier 4.1c

Based on the table above, efficient savings and loan cooperatives have an efficiency value of 90-100 percent, namely the Kodanoa cooperative with an efficiency value of 99.95 percent, the Wira Karya Jaya cooperative with an efficiency value of 92.57 percent and the Tunas Jaya cooperative with an efficiency value of 96.91 percent. The cooperative value is relatively high but not yet in the efficient category, namely 70-89 percent, namely the Sumber Jaya cooperative with an efficiency value of 83.29 percent, the Sejati Mulya cooperative with an efficiency value of 77.71

percent, the Sehati cooperative with an efficiency value of 88.87 percent, cooperative The results with an efficiency value of 87.91 percent, for cooperatives with an efficiency value of 87.91 percent < 70 percent are the Ceger cooperative with an efficiency value of 69.38 percent, the Mother's Welfare cooperative with an efficiency value of 66.69 percent and the Makmur Cooperative with an efficiency value of 66. 37 percent.

On average, the 11 community-owned cooperatives have an efficiency value of 83.39

percent, which means that community-owned cooperatives in Jakarta have not achieved efficiency. This efficiency value is from the contribution of the independent variables, namely number of members, amount of capital, operational costs, amount of assets, amount of credit and debt repayment, which shows that all variables have an efficiency function that has a positive and significant effect on profit efficiency.

Results of analysis of differences in profit efficiency of the SFA method between Government-Owned Savings and Loans Cooperatives (KK) and Civil Society (KM).

One-SampleStatistics

	N	Mean	Std.Deviation	Std.ErrorMean
SFA Analysis Exam of government and General Public Cooperatives	22	81.4909	12.75313	2.71898

One-SampleTest

	TestValue=0					
	t	df	Sig.(2-tailed)	MeanDifference	95% Confidence Interval oftheDifference	
					Lower	Upper
SFA Analysis Exam of government and General Public Cooperatives	29.971	21	.000	81.49091	75.8365	87.1453

Source: Calculation results with SPSS version 17

Based on the results of the analysis of the difference in profit efficiency values using the SFA method, the average of 22 cooperatives is 81.49 percent, with a standard deviation of 12.75, and the results of the analysis of statistical values > table, or a significance level of $0.000 < 0.05$, which means there is differences in the profit efficiency of savings and loan cooperatives with the SFA method owned by government agents and cooperatives owned by the community.

Analysis of the Efficiency of Savings and Loans Cooperatives Owned by Civil Servants (KK) and Civil Society Owned (KM) using the Data Envelopment Analysis (DEA) method

The efficiency test of Savings and Loans Cooperatives is evaluated based on efficiency calculations using Data Envelopment Analysis (DEA). Variables using input data are the number of members, amount of capital and operational costs and output data, namely the amount of profit, amount of assets, amount of loans and debt repayment Efficiency Table of Savings and Loans Cooperatives owned by civil servants (KK) and publicly owned (KM) using the DEA Method (CRS and VRS)

Code	Name	Efficiency with SFA (%))	
		CRS	VRS
KK01	Cooperative of RSJiwa,Dr.SuhartoHeerjan	34.65	75.23
KK02	Cooperative of RumahSakitPelni	37.08	63.64
KK03	Cooperative of PrimierMandiriSejahtera	43.32	62.64
KK04	Cooperative of PerumPeruri	43.63	81.7
KK05	Cooperative of Dep.AgamaJakartaSelatan	44.57	77.69
KK06	Cooperative of IbupejabatKebersihan	48.14	75.04
KK07	Cooperative of SekjenPendidikanKebudayaan	40.10	53.26
KK08	Cooperative of KementerianAgamaRI	51.54	81.21
KK09	Cooperative of PrimkopalKolinlamil	58.12	86.76
KK10	Cooperative of GuruDanKaryawanSMA 45	66.6	90.75
KK11	Cooperative of KawasanBerikatNusantara	59.81	85.08
	Amount	527.48	833.03

Average KK	**47.95**	**75.73**
KM12Cooperative of SumberJaya	71.40	100
KM13Cooperative of KspKodanoa	28.91	51.28
KM14Cooperative of SejatiMulya	54.74	74.47
KM15Cooperative of Sehati	29.87	61.54
KM16Cooperative of RawaBadung	35.40	55.69
KM17Cooperative of WiraKaryaJaya	72.40	100
KM18Cooperative of Ceger	100	100
KM19Cooperative of TunasJaya	50.89	54.21
KM20Cooperative of KesejahteraanKaumIbu	58.47	79.47
KM21Cooperative of KemauanBersama	100	100
KM22Cooperative of Makmur	63.12	64.39
Amount	665.20	841.05
Average KK	**60.47**	**76.46**
Average KKand KM	**54.21**	**76.10**

Source: Calculations using Data Envelopment Analysis (DEA)

Based on the table above, it can be seen that the efficiency test calculation uses DEA with two methods, namely constant return to scale (CRS) and variable return to scale (VRS). For government-owned Savings and Loan Cooperatives using the CRS method, the highest efficiency value is the Teacher and Employee Savings and Loans Cooperative for SMA Negeri 45 at 66.61 percent, followed by the Nusantara Bonded Savings and Loans Cooperative at 59.81 percent, and the smallest efficiency is the Savings and Loans Cooperative. Mental Hospital Dr. Suharto Heerjan amounted to 34.65 percent.

The average efficiency of eleven cooperatives using the CRS method is 47.95 percent, meaning that the government-owned Savings and Loans Cooperative calculated using the CRS method has not yet reached 100 percent, so the cooperatives are not efficient. As for the government-owned Savings and Loans Cooperative, the highest efficiency score was found in the Teacher and Staff Cooperative of SMA Negeri 45 at 90.75 percent, followed by the Primkopal Kolinlamil Loan Cooperative at 86.76 percent, and the smallest efficiency score was the Cultural Education Secretariat Savings. and Loan Cooperatives of 53.26 percent.

The average efficiency value using the VRS method is 75.73 percent. The efficiency value using the VRS method has not yet reached 100 percent, which means it is not yet efficient. So that the two methods used have different results, for calculations with the VRS method the value is greater than the CRS, even though both have not reached 100 percent. The conclusion is that none of the eleven cooperatives owned by the government are efficient, but there is one Teacher and Employee Savings and Loan Cooperative for SMA Negeri 45 whose score has reached 90.75 percent, almost 100 percent, which means it is in the efficient category. There are still ten cooperatives that are not yet efficient. For community-owned Savings and Loans Cooperatives, the highest efficiency calculation results using the CRS method are found in KSP Ceger and Kemuan Bersama Cooperatives with an efficiency value of 100 percent, followed by the Wira Karya Jaya Savings and Loans Cooperative with an efficiency value of 72.40 percent while other cooperatives have the smaller ones are the Kodanoa Cooperative at 28.91 percent and the Sehati Simpanjam Cooperative at 29.87 percent.

The average efficiency value of the eleven cooperatives is 60.47 percent, which means that community-owned Savings and Loans Cooperatives are not yet efficient with the CRS method. So that there are two community-owned Savings and Loans Cooperatives that are already efficient and the remaining nine cooperatives are not yet efficient because their value is still below 100 percent. Furthermore, the greatest efficiency value with the VRS method is the Sumber Jaya Savings and Loans Cooperative by 100 percent, the Wira Karya Jaya Savings and Loans Cooperative by 100 percent, the Ceger Savings and Loans Cooperative and the Kemuan Bersama Savings and Loans Cooperative by 100 percent, followed by other cooperatives Savings and Loans Cooperatives The Prosperous Mother of 79.19 percent and the Savings and Loans Cooperative which has the lowest efficiency value, namely the Kodanoa Cooperative of 57.27 percent.

The average efficiency value of the eleven cooperatives is 76.46 percent, which means that Savings and Loans Cooperatives are still not

efficient, but there are four savings and loan cooperatives that have reached 100 percent, which means the cooperatives are efficient, and seven other cooperatives are still below 100. percent, meaning it is not efficient. So, there are differences in the methods used to calculate efficiency values, namely CRS and VRS, that is, if the calculated efficiency value of the VRS method is greater than CRS (VRS value of 76.46 percent > CRS value of 60.47 percent means the VRS method is better than the CRS method, it is found that the VRS method achieves 100 percent efficiency for four cooperatives while the CRS method is fully efficient for only two cooperatives. To compare the efficiency value with the DEA method (CRS and VRS) between government-owned and publicly owned Savings and Loans Cooperatives, the efficiency value has reached 100 percent for The two government-owned Savings and Loans Cooperatives, for the government-owned Savings and Loans Cooperatives there are four cooperatives, meaning that the community-owned Savings and Loans Cooperatives are more likely to achieve efficiency and also the average efficiency value of community-owned cooperatives is greater than the government-owned Savings and Loans Cooperatives. The efficiency value of twenty-two cooperatives using both CRS and VRS methods, the average efficiency value for CRS was 54.10 percent and VRS was 76.10 percent. The calculation results using these two methods have

not yet reached 100 percent, which means they are still not efficient, but there are five cooperatives out of twenty-two cooperatives that have achieved 100 percent or almost 100 percent efficiency with these two methods, namely Teachers and Employee Savings and Loans Cooperative SMA 45, Cooperative Sumber Jaya Savings and Loans Cooperative, Wira Karya Jaya Savings and Loans Cooperative, Ceger Savings and Loans Cooperative and Mutual Will Savings and Loans Cooperative.

So that there are seventeen Savings and Loans Cooperatives owned by the government and the community that have not yet achieved full efficiency. This proves that the Savings and Loans Cooperative has not been able to optimize and utilize existing resources to produce optimal output. Therefore, Savings and Loans Cooperatives must be able to optimize their operational activities so that efficiency values can increase 100 percent in the future. This is in line with the previous study by Ardiani Rohmah (2014). Which shows that there are fourteen efficient cooperatives out of twenty-one Savings and Loans Cooperatives which are not yet efficient due to excessive use of input and less than optimal output. This inefficiency is caused by excessive use of input which covers the use of employee needs and the advice given is how to improve cooperative performance and also optimize the use of capital.

Table of Test Table of Differences in the Efficiency of Civil Servants (KK) and Publicly Owned (KM) Savings and Loans Cooperatives with the DEA Method (CRS and VRS)

One-SampleStatistics

	N	Mean	Std.Deviation	Std.ErrorMean
DEA_CRS Analysis Test of Civil Servant Cooperatives and the General Public	22	.542164	.1946635	.0415024
DEA_VRS Analysis Test of Civil Servant Cooperatives and the General Public	22	.760932	.1616671	.0344675

One-SampleTest

	TestValue=0					
	t	df	Sig.(2-tailed)	MeanDifference	95% Confidence Interval of the Difference	
					Lower	Upper
DEA_CRS Analysis Test of Civil Servant Cooperatives and the General Public	13.063	21	.000	.5421636	.455855	.628473
DEA_VRS Analysis Exam Civil Service Cooperatives and	22.077	21	.000	.7609318	.689253	.832611

General public						

Source: Calculation results with SPSS version 17

Based on Table 5.23, the results of testing the difference in efficiency values of savings and loan cooperatives using the DEA CRS method belonging to government agencies and those belonging to the community show that the statistical t value > t table or a significance level of 0.000 < 0.05 means that there is a difference in efficiency values between government officials and the general public. For the efficiency value of savings and loan cooperatives owned by government agencies and the community using the DEA VRS method, the statistical value test results are > table or a significant value of 0.000 < 0.05, meaning there is a difference in the efficiency value of cooperatives owned by government agents and cooperatives owned by the community using the DEA method. VRS.

V.   CONCLUSION

That the results of measuring the efficiency of the Savings and Loans Cooperative achieved an efficiency level using the SFA method compared to the Savings and Loans Cooperative owned by state employees with 3 cooperatives recording an average efficiency of 79.58 percent. Meanwhile, 3 community-owned cooperatives achieved an efficient level with an average of 83.39 percent and the average value of 22 cooperatives was 81.49 percent. Using the DEA method, cooperatives owned by government employees recorded an average efficiency of 75.73 percent, publicly owned cooperatives with an average efficiency of 76.46 percent and 22 cooperatives an average of 76.10 percent. It can be concluded that the efficiency value using the SFA method is greater than the DEA method. In addition, the efficiency of savings and loan cooperatives owned by the public is greater than the efficiency of savings and loan cooperatives owned by state employees.

This study found that the efficiency of the Savings and Loans Cooperatives studied in the Jakarta Region was quite good with an average value of above 75 percent overall. Cooperatives in Indonesia do not yet openly make financial reports that can be accessed by the public via websites like banks do. Scientific studies on cooperatives cannot be carried out in depth by researchers in tertiary institutions due to limited data. This study may only concentrate on the government sector which tends to lack expertise in producing in-depth analysis using various econometric methods. Based on the limitations discussed above, several suggestions are given as follows: First, the government needs to immediately create a policy so that cooperatives provide clear and responsible data information regarding financial reports and other matters related to the operations of Savings and Loans Cooperatives. In this way, a thorough cooperative study can be carried out and the findings can be utilized more broadly. Second, efforts to provide information and data regarding financial reports and details of cooperatives online need to be initiated and encouraged so that access can be made by researchers. In this way, financial costs and time can be saved when cooperative studies can be carried out immediately. Third, the government can provide various incentives to cooperatives that have complete information and take the initiative to increase data distribution to the public because this indirectly encourages the development of scientific studies which ultimately benefits many shareholders.

REFERENCE

[1]. Aigner,D.,Lovell,C.K.,&Schmidt,P.(1977).Formulationandestimationofstochasticfrontier productionfunctionmodels.Journal ofeconometrics, 6(1), 21-37.

[2]. Al-Faraj, T. N., Alidi, A. S., & Bu-Bshait, K. A. (1993). Evaluation of bank branches by means of dataenvelopment analysis. International Journal of Operations & Production Management, 13(9),45-52.

[3]. Ali, A. I., &Seiford, L. M. (1993). The mathematical programming approach to efficiency analysis. Themeasurement ofproductive efficiency:Techniquesandapplications, 120-159.

[4]. Ali, A.R. (2017). Pengukurankinerja bank perkreditan rakyat di kotamalangberdasarkanpendekatanefisiensid enganmetodeDataEnvelopmentAnalysis(DE A).JornalRisetAkuntansi,6(04).

[5]. Al-Jarrah, I., &Molyneuxa, P. (2003). Cost efficiency, scale elasticity and scale economies in Arabianbanking. Financial Developmentin ArabCountries, 25.

[6]. Ara, S. (2016). Profit and Cost Efficiencies of Conventional Banking (CB) and Islamic Banking (IB) UsingStochastic Frontier Approach: A Comparative Study. Journal of Islamic Economics, Banking andFinance,113(3517), 1-27.

[7]. Ardiani Rohmah, (2014). EfisiensiKoperasiSimpanPinjam dan Unit SimpanPinjam di Jawa Timur denganKaedah Data EnvelopmentAnalysis(DEA).(MasterThesis, UniversitasAirlangga).

[8]. Ariffin,Ramudi,(2010).Dasar-dasarPengukuranKinerjaKoperasi.Coopetition,vol.1No.1.

[9]. Asti Mardianan Putri, (2016). AnalisisEfisiensi Bank Persero dan Bank Asing denganKaedah StochasticFrontier Analisis (SFA) dan Analisis of Varians (ANOVA). (kajiankes di Bank Persero dan bankasingdiIndonesia),(MasterThesisFakultasEkonomikadanBisnisUniversitasDiponegoro).

[10]. Athanassopoulos,A.D.(1997).Servicequality andoperatingefficiencysynergiesformanagementcontrolin the provision of financial services: Evidence from Greek bank branches. European Journal ofOperationalResearch, 98(2), 300-313.

[11]. Banker, R. D., Charnes, A., Cooper, W. W., Swarts, J., & Thomas, D. (1989). An introduction to dataenvelopment analysis with some of its models and their uses. Research in governmental andnonprofitaccounting, 5, 125-163.

[12]. Bardhan, I. R., Cooper, W. W., & Kumbhakar, S. C. (1998). A simulation study of joint uses of dataenvelopmentanalysisandstatisticalregressionsforproductionfunctionestimationandefficiencyevaluation.Journal ofProductivityAnalysis,9(3), 249-278.

[13]. Beccalli,E.,Casu,B.,&Girardone,C.(2006).EfficiencyandstockperformanceinEuropeanbanking. JournalofBusinessFinance &Accounting, 33(1-2),245-262.

[14]. Bekkum, O. V., &Bijman, J. (2006, May). Innovations in cooperative ownership: converted and hybridlisted cooperatives. In 7th international conference on management in agrifood chains andnetworks,Ede, TheNetherlands (Vol.31).

[15]. Berger,A.N.,&Humphrey,D.B.(1992).Measurementandefficiencyissuesincommercialbanking.

[16]. InOutputmeasurementintheservicesectors (pp.245-300).UniversityofChicagoPress

[17]. Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey anddirectionsforfutureresearch.European journalofoperationalresearch,98(2),175-212.

[18]. Charnes, A., Cooper, W. W., Lewin, A. Y., &Seiford, L. M. (Eds.). (2013). Data envelopment analysis:Theory,methodology, and applications.SpringerScience&BusinessMedia.

[19]. Charnes,A.,Cooper,W.W.,&Rhodes,E.(1978).Measuringtheefficiencyofdecisionmakingunits.Europeanjournal ofoperational research, 2(6), 429-444.

[20]. Charnes, A., Cooper, W. W., Huang, Z. M., & Sun, D. B. (1990). Polyhedral cone-ratio DEA models with anillustrativeapplicationtolargecommercialbanks. Journalofeconometrics,46(1-2),73-91.

[21]. DewiIstiqomah,(2016),Analisispengelolaan modalkerjakoperasigunameningkatkanefisiensioperasionalpadakoperasiGondanglegi.(SarjanaThesis,FakultasIlmuAdministrasiUniversitasBrawijaya).

[22]. DjokoMulyono,(2012).BukuPintarStrategiBisnisKoperasiSimpanPinjam.PenerbitAndi,Yoyakarta.

[23]. Drake, L., & Howcroft, B. (1999). Measuring the relative efficiency of the selling function: an applicationof data envelopment analysis to UK bank branches. Journal of Financial Services Marketing, 3,297-315

[24]. Kusnadihendar,(2005).EkonomiKoperasi,Lembaga.PenerbitFakultasEkonomiUniversitas Indonesia.

[25]. Kusumo, W. K., & Karim, A. (2017). Pengembangan model non parametrikmetode DEA dalammengukurtingkatefisiensibiayapadaPerbankanSyariahdikotaSemarang. JurnalDinamikaSosialBudaya,19(1), 148-162.

[26]. Kusumaningrum, A. (2008). Efisiensikinerjakeuangankoperasidengan model DEA (Studi Kasus PadaKoperasiKecamatan di KabupatenSragen) (Doctoral dissertation, Universitas MuhammadiyahSurakarta).Koperasi.Jakarta: GramediaWidiasaranaIndonesia.

[27]. Nasution, M., Budiana, T., Kusumastuti, & Murni, S. H. (2008). Koperasi: menjawabkondisiekonominasional.Pusat informasiPerkoperasian.

[28]. Reksohadiprojo,Sukanto,(2010).Manajemen Koperasi.FakultasEkonomUniversitasGajah Mada,Jogyakarta,BPFE.

[29]. Setiawan, D. (2012). Penilaiantingkatkesehatankoperasipegawaire publik Indonesia rumahsakitumumdaerahDr.SaifulAnwarmala ngberdasarkanperaturanmenterikoperasiNo.1 4/per/M.KUKM/XII/2009(tahun2010-2012).JurnalMahasiswafeb,2(2).

[30]. Solikah,Y.U.(2010). Analisisefisiensikoperasipegawainegerirepu blikIndonesiadikabupatenKlaten(Doctoral dissertation, UniversitasSebelasMaret).

[31]. Yuni Nurmawati, Y. (2015). PengaruhJumlahAnggota, JumlahSimpanan, JumlahPinjaman Dan JumlahModalKerjaTerhadapSisaHasilUsaha (SHU)PadaKoperasiSimpanPinjam(KSP)Ya ngBernaungDiBawahDinasKoperasiDanUM KMKabupatenKulonProgoTahun2011-2014(Doctoraldissertation,FakultasEkonomi UniversitasNegeri Yogyakarta).

[32]. Yusniar (2007). AnalisisEfisiensi Relative KoperasiSimpanPinjam Di Provinsi Kalimantan Selatan DenganMenggunakanKaedahDataEnvelopm entAnalysis(DEA).(DoctoraldissertationFak ultasekonomi,UniversitasLambungMangkur at).