The Efficiency of Pesantren Cooperative using Data Envelopment Analysis (DEA): A Case in Indonesia

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The purpose of this research is to analyze the level of efficiency of Islamic boarding schools cooperatives as well as potential improvements needed, and to compare the efficiency of Islamic boarding schools cooperatives. In addition, this research also looks at the efficiency of Islamic boarding school cooperatives during the Covid-19 pandemic. The research period used in this research is from 2014-2021 with a research sample of 2 Islamic boarding schools cooperatives. The analytical method used is a non-parametric approach, namely Data Envelopment Analysis (DEA), with secondary data sources originating from the financial reports of Islamic boarding schools cooperatives as the research sample. Furthermore, the input variables used are fixed assets, mandatory savings and principal savings. The output variable consists of SHU and deposits in other bodies. The results of this study indicate that the efficiency of Islamic boarding school cooperatives during the 2014-2021 period has fluctuated from year to year. Based on the level of efficiency, the Islamic boarding school cooperative B has a higher efficiency compared to the Islamic boarding school cooperative A. Then in the analysis of efficiency during the pandemic, the efficiency of the Islamic boarding school A cooperative tends to be relatively stable. Meanwhile, the pesantren B cooperative showed a significant increase in 2021, even though it experienced a decline in the 2020 period. And based on analysis*potential improvement*, the biggest cause of inefficiency in pesantren A cooperative comes from the input variable, namely SHU, and in pesantren B cooperative is fixed assets. This research also provides recommendations to cooperatives to further increase their efficiency, for regulators, it is expected to provide full support to Islamic boarding schools cooperatives, and for academics to update this research in line with research limitations.

Keywords: Islamic Boarding School Cooperatives; Efficiency; Covid-19 pandemic; DEA

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INTRODUCTION

Islamic boarding schools are traditional Islamic educational institutions that have evolved over time to include formal educational units similar to those found in public schools (Dawami, 2022; Budiman & Lathifah, 2019). Islamic boarding schools have an important role in education and human resource development in Indonesia. Among the roles of pesantren which are in line with the functions of pesantren, namely as centers of Islamic education and places of preservation of traditional Islamic values and practices, pesantren can also become a reference for the community to seek solutions to legal problems (Mahmudi, 2012), and play a strategic role in overseeing the halal supply chain. in Indonesia by educating the public about the criteria for halal and haram materials and carrying out various business activities such as food and beverage production (Hajar, 2023).

Given the important role of Islamic boarding schools, one of the efforts made by Islamic boarding schools to strengthen their function is through Islamic boarding schools cooperatives. This cooperative aims to empower the economic independence of Islamic boarding schools and their communities. Islamic boarding school cooperatives can manage various types of businesses ranging from animal husbandry, agriculture, trade, small industry, services, to other economic sectors. The main objective of establishing a pesantren cooperative is to improve the welfare of the students, the pesantren community, and the surrounding community through sustainable economic empowerment. The importance of pesantren cooperatives in addition to strengthening the function of pesantren is to empower the economic independence of pesantren and the community around Islamic boarding schools, hone the practical skills of students, and pesantren can continue to play an important role in the development of religion, social, economy and technology in Indonesia (Ashar, 2017).

However, in practice, Islamic boarding school cooperatives are often faced with several obstacles that can hinder the development of cooperatives. According to Aji (2011) the level of participation, commitment, and ability to innovate in Islamic boarding school cooperatives is still low, which can hinder the development of cooperatives. In addition, other constraints relate to limited access to capital, many pesantren cooperatives do not have the necessary business skills to run a successful business, limited market access, competition from other businesses in the same industry, and a lack of government support which can make it difficult for them to access resources and funding (Ashar, 2017; Hajar, 2023). Some of these things can lead to poor financial management and low profitability, which in turn affect the development of Islamic boarding schools cooperatives.

Therefore, it is necessary to measure the efficiency level of Islamic boarding school cooperatives to see how far the Islamic boarding school cooperative has performed so that it can provide greater benefits to Islamic boarding school residents and the surrounding community. By conducting an efficiency assessment, Islamic boarding school cooperatives will have a clear picture of their performance, and can serve as a guide in carrying out their operational activities. Through efficiency measurements, it can also be seen how well Islamic boarding school cooperatives utilize all available resources to produce optimal output. Several studies relevant to this topic include Fatimatuzzahroh et al (2015) explaining the potential of Islamic boarding schools for sustainable village development; Ismail (2012) examines the success factors of Islamic boarding school cooperatives and their implications for the welfare of their members; Yusuf (2016) explains the soundness level of sharia cooperatives; Sujianto (2012) describes the variables that influence the performance of Islamic boarding school cooperatives in Tulungagung district; Rahayu & Rusydiana (2018) analyzed the efficiency of Islamic boarding school cooperatives in Indonesia; Aji (2011) explains the factors that influence the performance of Islamic boarding schools cooperatives; Masrifah (2019) explains the efficiency of BMT pesantren; and Syarbani (2012) analyzed the effect of student participation, commitment, and the ability to innovate on the performance of Islamic boarding school cooperatives in the city of Semarang.

Based on some of these studies, there has been no research that specifically addresses the level of efficiency of Islamic boarding school cooperatives during the 2014-2021 period. This explains that research related to the efficiency of pesantren cooperatives is still very limited and rarely done. Therefore, this research specifically aims to analyze the level of efficiency of Islamic boarding schools cooperatives and the potential for improvement needed, and comparison of the efficiency of Islamic boarding schools cooperatives. In addition, this research also looks at the efficiency of Islamic boarding school cooperatives during the Covid-19 pandemic.

PREVIOUS STUDY

Islamic boarding schools are an alternative education that has the potential to be able to overcome negative stigma with a strong desire, ability, and collaboration with the community through empowerment programs that have succeeded in forming business groups and sharia cooperatives or better known as pesantren cooperatives (Kopontren) (Chusmeru et al., 2017). Kopontren has the aim of empowering Islamic boarding schools and the surrounding community through various economic activities carried out collectively. Kopontren are usually established to provide education, skills development and training for santri in business management and sharia economics. Apart from that, the Kopontren also functions as a means for the community around the Islamic boarding school to participate in economic activities based on the principles of the Kopontren such as justice, togetherness and independence which are of course in accordance with Islamic sharia rules.

In a broad scope, Kopontren can manage various types of businesses, such as animal husbandry, agriculture, trade, small industry, services, and other economic sectors. The main objective of holding a pesantren cooperative is to improve the welfare of the students, the pesantren community, and the surrounding community through sustainable economic empowerment. Aji (2011) explains the collectivity principles of the kopontren, namely openness, fairness, respect for humans, autonomy, freedom of expression or desire, member education and active cooperation among co-operatives. With the existence of collectivity which is the basic principle of the kopontren, it can provide various advantages for cooperative members. This confirms that the existence of pesantren cooperatives can have a real impact on the economic sustainability of pesantren and the surrounding community. Therefore, Kopontren needs to maintain its level of efficiency.

Efficiency is a financial concept that evaluates the extent to which inputs invested produce output (Belanes et al., 2015). Efficiency measurement was developed by Farrell (1957), who revealed that efficiency measurement consists of technical efficiency (TE) and allocative efficiency. The output-to-input ratio is referred to as TE. Conversely, allocative efficiency refers to the ability of a business to maximize input according to its pricing system and production technology. Efficient businesses make it possible to produce more output per unit of input than competing businesses. Cooperatives, like any business, must consistently improve their operational efficiency. Efficiency has been widely used as a performance measurement tool in various financial industries, one of which is cooperatives. There are various ways to increase efficiency, including increasing the concentration and profitability of microfinance institutions (Hartarska et al., 2013). In addition, increasing the number of loans will also increase efficiency (Bos & Millone, 2015). In addition, the efficiency of microfinance institutions is affected by the profit component or the amount of margin they use (Amran et al., 2014).

Several previous studies have examined a lot related to bank efficiency, but very few studies have specifically examined the level of efficiency of Islamic boarding school cooperatives. Among the studies that are relevant to this research include Rahayu & Rusydiana (2018) analyzing the efficiency of Islamic boarding school cooperatives in Indonesia. The results of the analysis found that there were 9 DMUs that achieved optimal efficiency (100%) and 11 DMUs that were inefficient. The most inefficient cooperative is the Himat Cooperative (2014) with an efficiency level of 30.66%. The IAILM Kopkar was able to maintain its efficiency grade from 2009 to 2015 when compared to other DMU Cooperatives observed, except for 2014. The calculation of the efficiency level in this study is relative and not absolute, so it does not rule out the possibility that if the cooperative sample is added or the year of observation is added, different results will be obtained. It is necessary for every Islamic boarding school-based cooperative or BMT to make an annual financial report to increase accountability and transparency in fund management.

Aji (2011) explains the factors that influence the performance of Islamic boarding schools cooperatives. The results of the study found that the level of participation, commitment, and ability to innovate in Islamic boarding school cooperatives is still low. This is also reflected in the performance of Islamic boarding school cooperatives which is still low, such as a decrease in business and the remaining annual operating results. Through analysis *goodness of fit index* and models *regression weight*, this study shows that participation, commitment, and the ability to innovate have a significant influence on the performance of Islamic boarding school cooperatives. Thus, it can be concluded that the low performance of cooperatives is caused by a lack of participation, commitment, and ability to innovate from members in managing Islamic boarding school cooperatives.

Masrifah (2019) explains the efficiency of BMT pesantren. The results of the study show that in general the efficiency of BMT Islamic Boarding Schools is

relatively high. Scale efficiency also shows that BMT operations are close to optimal scale. In addition, the results of the analysis also show that most Islamic boarding school BMTs are still focused on baitut tamwil activities, by expanding financing as their main business. Meanwhile, in the future, BMT must play an active role in baitul maal activities as its main business.

Other relevant studies include Fatimatuzzahroh et al (2015) explaining the potential of Islamic boarding schools for sustainable village development; Ismail (2012) examines the success factors of Islamic boarding school cooperatives and their implications for the welfare of their members; Yusuf (2016) explains the soundness level of sharia cooperatives; Sujianto (2012) describes the variables that influence the performance of Islamic boarding school cooperatives in Tulungagung district; and Syarbani (2012) analyzed the effect of student participation, commitment, and the ability to innovate on the performance of Islamic boarding school cooperatives in the city of Semarang.

RESEARCH METHODS

This research is quantitative research conducted using a non-parametric approach, using the Data Envelopment Analysis (DEA) method as a tool to measure the efficiency of Islamic boarding schools cooperatives. The sample in this study consisted of 2 Islamic boarding school cooperatives that had financial reports for 2014-2021. Furthermore, this study uses an output-oriented approach in comparing the results of the analysis of the efficiency of pesantren cooperatives. The inputs used in the DEA method are fixed assets, mandatory savings and principal savings. The output variable consists of SHU and deposits in other bodies. The DEA method is used in this study to evaluate the relative efficiency and managerial performance of a production unit or DMU.

There are two DEA models that are often used, namely the Charnes, Cooper, and Rhodes (CCR) model and the Banker, Charnes, and Cooper (BCC) model. The main difference between the two is in the return to scale approach used. The CRS approach is used in the CCR model which means that when there is an addition of 1 input variable there will be an increase in output by 1. Meanwhile, the VRS approach is used in the BCC model which produces Pure Technical Efficiency (PTE). The VRS approach assumes that when there is an additional input, the resulting additional output will not have the exact same ratio.

Efficiency in DEA is measured on a scale of 0 to 1 or 100%. The value of 100% indicates that the efficiency achieved has actually been maximized, while the smaller the efficiency value, the more inefficient the Islamic boarding school cooperative is. The VRS approach to the BCC model is more suitable for use in conditions of competition and financial constraints that can lead to inefficiencies in companies, so that they can provide more accurate results in measuring the efficiency of Islamic boarding school cooperatives. In practice, DEA is widely used to measure the efficiency of banking (Marlina et al., 2018), insurance (Rusydiana & Nugroho, 2017), as well as zakat institutions (Bahri et al., 2023).

RESULTS AND DISCUSSION

Islamic Boarding School Cooperative Descriptive Statistics

Table 1 represents the input variables and output variables as well as descriptive statistics on the input and output of the pesantren cooperatives used in this study during the 2013-2021 period.

Table 1: Descriptive Statistics of Islamic Boarding School Cooperatives

Variables	Mean	Min	Max	Std.Dev
Input				
Aktiva Tetap	Rp158.520.474,17	Rp216,94	Rp593.491.128,00	Rp202.836.152,00
Simpanan Wajib	Rp88.667.280,94	Rp30.088.600,00	Rp138.955.400,00	Rp35.510.491,84
Simpanan Pokok	Rp6.337.106,25	Rp2.525.000,00	Rp12.174.900,00	Rp3.445.171,90
Output				
Simpanan pada Badan Lain	Rp10.173.256,25	Rp100,00	Rp37.743.383,00	Rp10.830.660,89
SHU	Rp25.153.080,00	Rp6.955.750,00	Rp51.836.735,00	Rp14.123.531,15

Summary of Islamic Boarding School Cooperative Efficiency Panel per Year

With the DEA method, the efficiency of pesantren cooperatives has been examined annually and investigated using *common frontlier*. The table below shows the average Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) of pesantren cooperatives from 2013 (Panel A), 2014 (Panel B), 2015 (Panel C), 2016 (Panel D), 2017 (Panel E), 2018 (Panel F), 2019 (Panel G), 2020 (Panel H), 2021 (Panel I) and the whole year (Panel J).

Table 2: Summary of Islamic Boarding School Cooperative Efficiency Panel per Year

Years/Type of Efficiency	Mean	Min	Max	St.Dev
	Koperasi Pesantren	Koperasi Pesantren	Koperasi Pesantren	Koperasi Pesantren
Panel A (2013)				
TE	0,781	0,561	1,000	0,219
PTE	1,000	1,000	1,000	0,000
SE	0,781	0,561	1,000	0,219
Panel B (2014)				
TE	0,733	0,467	1,000	0,267
PTE	0,831	0,662	1,000	0,169
SE	0,852	0,705	1,000	0,148
Panel C (2015)				
TE	0,373	0,373	0,373	0,000
PTE	0,505	0,505	0,505	0,000
SE	0,739	0,739	0,739	0,000
Panel D (2016)				
TE	1,000	1,000	1,000	0,000
PTE	1,000	1,000	1,000	0,000
SE	1,000	1,000	1,000	0,000
Panel E (2017)				
TE	0,419	0,344	0,495	0,076
PTE	0,466	0,409	0,523	0,057
SE	0,894	0,840	0,947	0,053
Panel F (2018)				
TE	0,419	0,300	0,538	0,118
PTE	0,449	0,306	0,591	0,142
SE	0,944	0,909	0,979	0,035
Panel G (2019)				
TE	0,678	0,477	0,879	0,201
PTE	0,747	0,548	0,945	0,199
SE	0,901	0,872	0,930	0,029
Panel H (2020)				
TE	0,582	0,424	0,740	0,158
PTE	0,724	0,545	0,902	0,178
SE	0,799	0,778	0,821	0,021

Panel I (2021)				
TE	0,600	0,363	0,837	0,237
PTE	0,772	0,544	1,000	0,228
SE	0,752	0,668	0,837	0,085
Panel J (All Years)				
TE	0,612	0,300	1,000	0,247
PTE	0,718	0,307	1,000	0,242
SE	0,849	0,561	1,000	0,128

From the table above, it can be seen that the average score*Technical Efficiency* The lowest (TE) in pesantren cooperatives was in 2015 (0.373), and the highest TE average score was in 2016 (1.000). Then, on average*Pure Technical Efficiency* (PTE), it is known that the highest PTE of pesantren cooperatives was in 2014 and 2016 (1,000) and the lowest was in 2018 (0,449). Next, for*Scale Efficiency* (SE) the lowest in Islamic boarding schools was in 2015 (0.739) and the highest score was in 2016 (1.000). Overall, the average efficiency level of pesantren cooperatives in TE, PTE and SE, respectively is (0.612), (0.718) and (0.849). Based on this, it can be concluded that the level of efficiency of pesantren cooperatives tends to fluctuate from year to year.

Islamic Boarding School Cooperative Efficiency Score

Table 3: Average Islamic Boarding School Cooperative Efficiency Score

Year		**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Mean**
Koperasi A	**CRS**	0,561	0,467	0,373	0,344	0,300	0,477	0,424	0,363	**0,414**
	VRS	1,000	0,662	0,505	0,409	0,307	0,548	0,545	0,544	**0,565**
Koperasi B	**CRS**	1,000	1,000	1,000	0,495	0,538	0,879	0,740	0,837	**0,811**
	VRS	1,000	1,000	1,000	0,523	0,591	0,945	0,902	1,000	**0,870**

Based on table 3 above, it can be concluded that during the study period at the pesantren A cooperative, based on the CRS assumption, there had not been a year when the pesantren A cooperative achieved an optimum level of efficiency. However, when viewed from the VRS assumptions, the pesantren A cooperative in 2014 was the year with the highest level of efficiency and achieved optimum efficiency (1,000). The lowest efficiency in the pesantren A cooperative based on the CRS and VRS assumptions respectively occurred in the same year, namely 2018 with values (0.300) and (0.307).

Furthermore, in pesantren B cooperatives, based on the CRS assumption, the optimum efficiency level (1,000) occurred in 2014-2016. Whereas on the VRS assumption, optimum efficiency (1,000) occurred in 2014-2016 and 2021. The lowest efficiency based on the CRS assumption occurred in 2017 with a value of (0.495), and on the VRS assumption also occurred in 2017 (0.523). Furthermore, if we look at the average efficiency level over time in the pesantren A cooperative and the pesantren B cooperative, it can be concluded that both on the CRS and VRS assumptions, the Islamic boarding school cooperative B has a higher efficiency level than the Islamic boarding school cooperative A. This can be seen from the average of the two cooperatives, where in cooperative A the average level of efficiency is CRS (0.414) and VRS (0.565). In pesantren cooperative B CRS (0.811) and VRS (0.870).

Comparison of Islamic Boarding School Cooperative Efficiency Trends

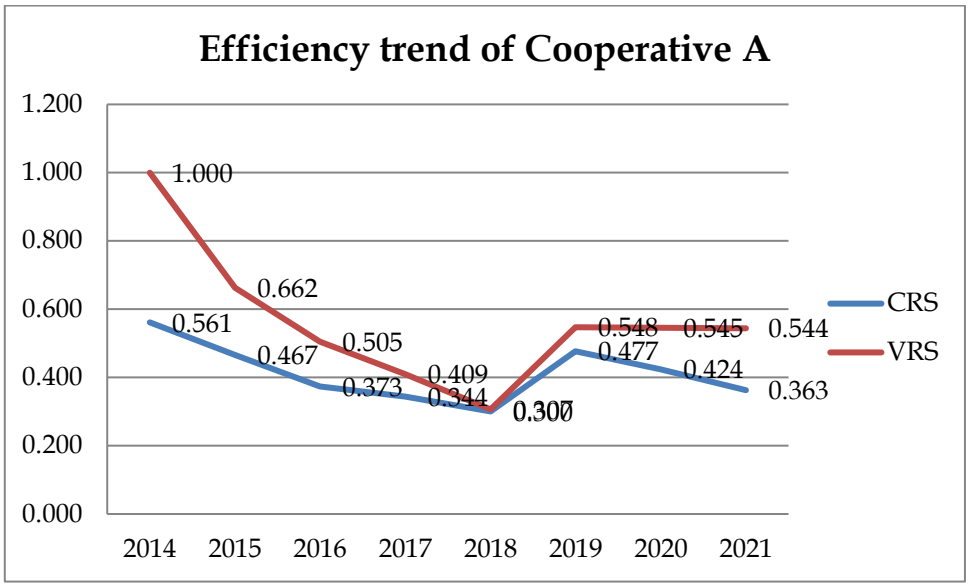

Figure 1: Trends in Islamic Boarding School Cooperative Efficiency A

Figure 1 represents the trend of the efficiency of the pesantren A cooperative during the 2014-2021 observation period. It can be concluded that the efficiency of the pesantren A cooperative has fluctuated from year to year. In 2014 the efficiency of the pesantren A cooperative based on the VRS assumption reached an optimum level of efficiency. Then in the following period, both the CRS and VRS assumptions both showed a significant decline until the 2018 period. Furthermore, in the following period the level of efficiency showed a relatively stable increase, only on the CRS assumption at the end of the 2021 period there was a decrease in the efficiency level. From the figure, there are interesting findings, namely that there is an almost similar pattern between the CRS and VRS assumptions.

Then, the trend of the efficiency of the pesantren B cooperative based on the CRS and VRS assumptions can be seen in the figure below.

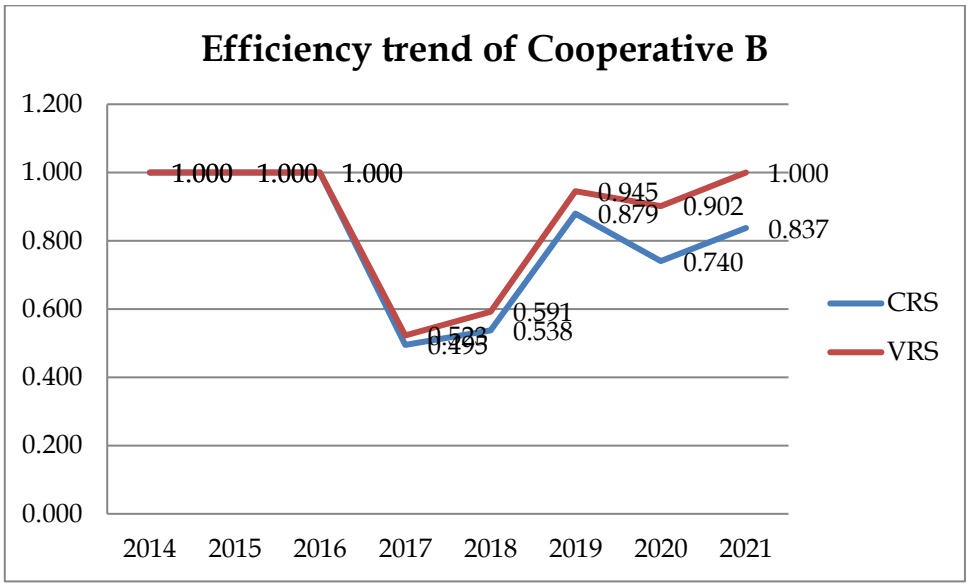

Figure 2: Trends in Islamic Boarding School Cooperative Efficiency B

Figure 2 explains the trend of the efficiency of the pesantren B cooperative during the 2014-2021 observation period. It can be concluded that the efficiency of the pesantren B cooperative has fluctuated

from year to year. In 2014 to 2016 both on the CRS and VRS assumptions, the efficiency of the pesantren B cooperative reached an optimum level of efficiency. Then in the following period, on both the CRS and VRS assumptions, the level of efficiency both showed a significant decline. Furthermore, in the period 2018 to 2019, the efficiency trend experienced a significant increase. In the 2020 period, the efficiency of the pesantren B cooperative has decreased again, then in the 2021 period the efficiency has increased again, where on the assumption of the VRS the efficiency level of cooperative B has reached an optimum level. From the figure, there are interesting findings, namely that there is an almost similar pattern between the CRS and VRS assumptions.

Next is a comparative analysis of the efficiency of the cooperatives of pesantren A and B. This comparison uses the VRS efficiency score for 8 research periods. The results are as follows:

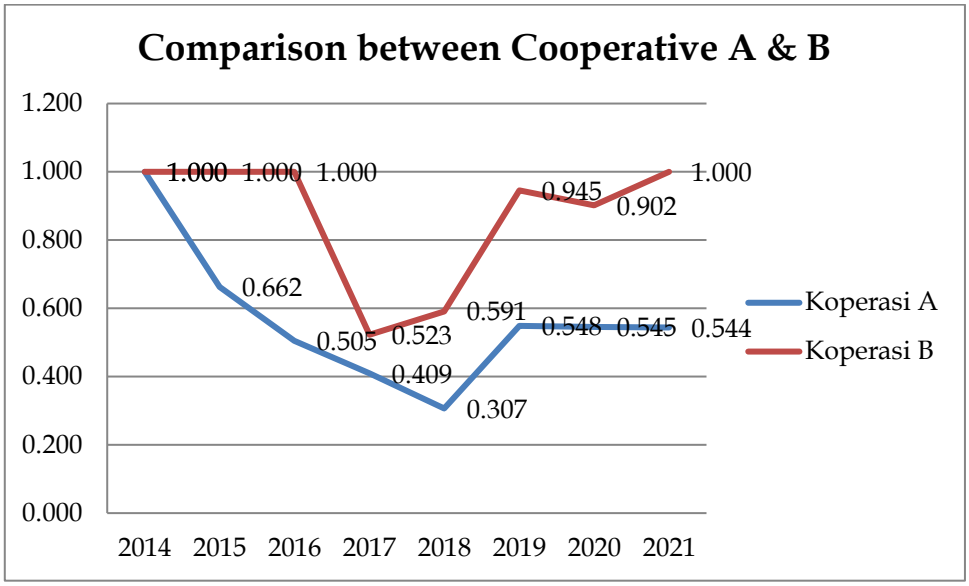

Figure 3: Comparison of Cooperative Efficiency Trends in Islamic Boarding Schools A and B

Based on figure 3, it is known that the efficiency level of the pesantren B cooperative is higher when compared to the efficiency level of the pesantren A cooperative. From 2014 to 2018, the efficiency of the pesantren B cooperative has decreased significantly, while in the same period the efficiency of the pesantren A cooperative has said to be stable, until it experienced a significant decline in the 2017 period. Furthermore, an increase in efficiency in the pesantren A cooperative occurred in the 2019 period until it moved stably until the 2021 period. Meanwhile, the Islamic boarding school cooperative B showed an increase in 2018 to 2019, which then decreased in 2020 and will increase again in the 2021 period.

Comparison of the Efficiency Levels of Cooperative Islamic Boarding Schools A and B During the Covid-19 Pandemic

The emergence of the Covid-19 pandemic at the end of 2019 and starting to spread massively in 2020 in Indonesia also had an impact on the national economy, one of which was the cooperative industry. The figure below explains the effect of Covid-19 on Islamic boarding school cooperatives using the CRS and VRS assumptions, as well as a comparison between the two cooperatives.

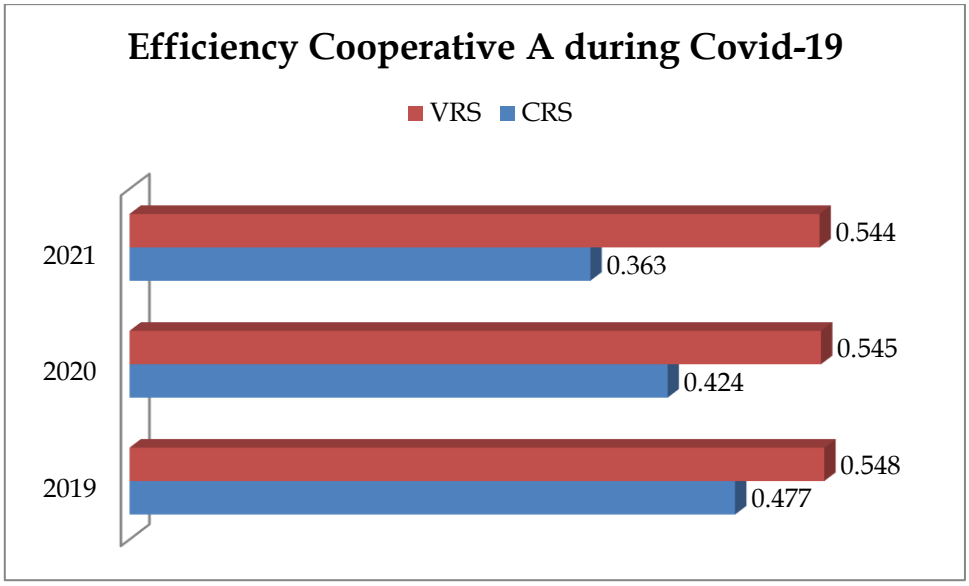

Figure 4: The Efficiency of Cooperative Islamic Boarding School A During the Covid-19 Pandemic

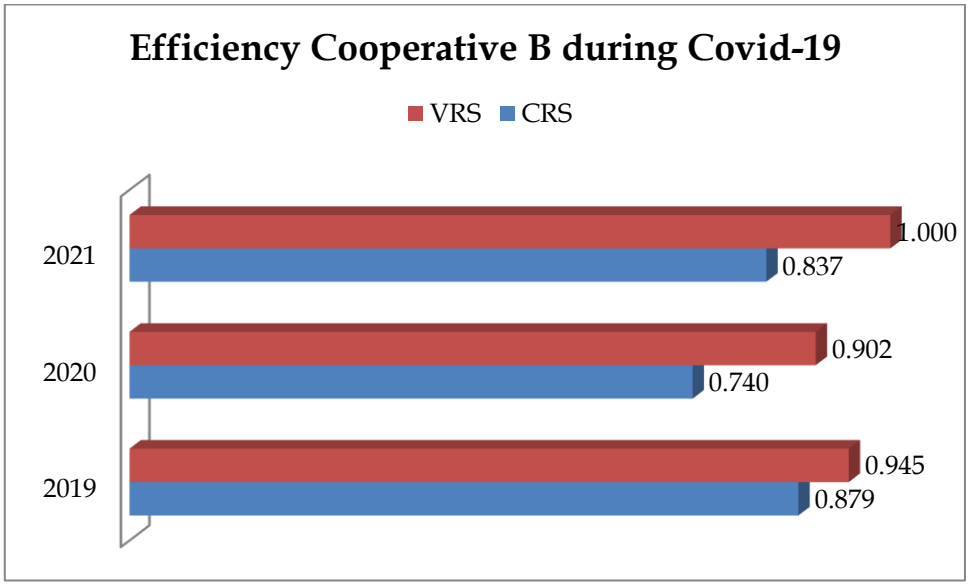

Figure 5: The Efficiency of Islamic Boarding School B Cooperatives During the Covid-19 Pandemic

Figures 4 and 5 above show the CRS and VRS analysis on the efficiency of pesantren A and B cooperatives during the pandemic. Figure 4 shows that the efficiency level of the pesantren A cooperative has decreased from 2019 to 2020 based on the CRS assumption. Meanwhile, based on the VRS analysis, the efficiency level of the pesantren A cooperative tends to be stable. It can be said that there was a decline in the pesantren A cooperative during the Covid-19 pandemic. Meanwhile, in Figure 5 it can be seen that the efficiency level of the pesantren B cooperative has actually increased in 2019. Then in 2020 the efficiency level has decreased, but at the end of 2021 the efficiency of cooperative B has increased again and even reached optimum efficiency. This indicates that there is no influence from the Covid-19 pandemic on the efficiency of the pesantren B cooperative. In contrast to the pesantren A cooperative, which actually experienced a decrease in efficiency, even though on the VRS assumption, the efficiency of the pesantren A cooperative tends to be stable.

Potential Improvement

With the DEA method can produce potential improvements (*Potential Improvement*) which is used to get the value that needs to be corrected in order to achieve the optimal level of efficiency. Through this potential improvement, we will get any variables that must be

improved to achieve optimal efficiency. Potential improvement analysis, using the last year of research, namely 2021, which is then analyzed separately from previous years to get an overview of the values that must be achieved. Below are the results of potential improvement measurements.

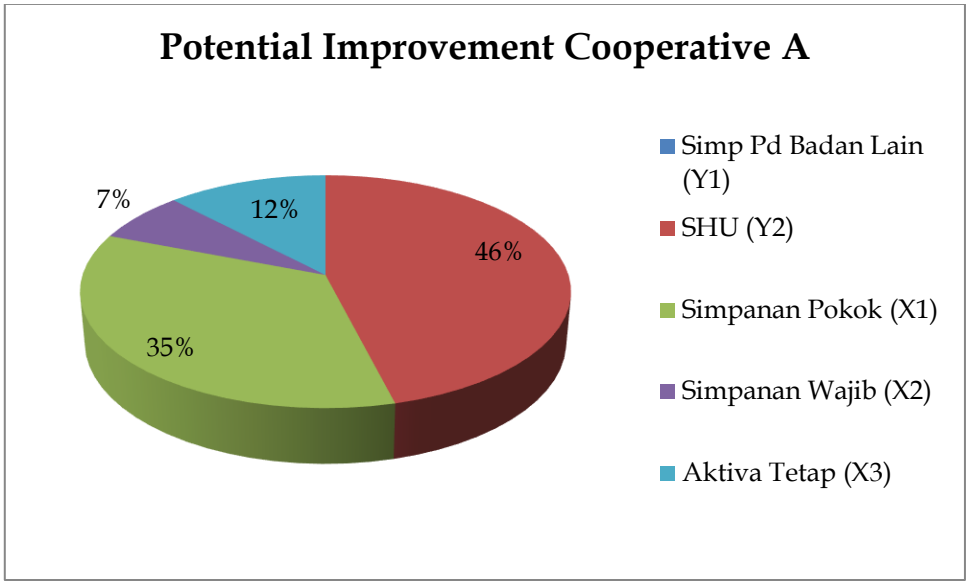

Figure 6: Potential Improvement of Islamic Boarding School Cooperatives A

From the figure, it is known that general information is related to the input and output variables that cause inefficiency in Islamic boarding school cooperative A. The input variables that cause inefficiency are principal savings, mandatory savings, and fixed assets. Meanwhile, the output variable is SHU. In the potential improvement analysis from Figure 6 it is known that, if the pesantren A cooperative wants to achieve an optimal level of efficiency then the output variable, namely SHU, needs to be increased by 46%. As for the input variables, namely principal savings reduced by 35%, mandatory savings reduced by 7%, and fixed assets decreased by 12%. It can be concluded that the biggest cause of inefficiency in the pesantren A cooperative comes from the output variable, namely SHU.

The next analysis is related to the potential improvement of the pesantren B cooperative, which is as follows.

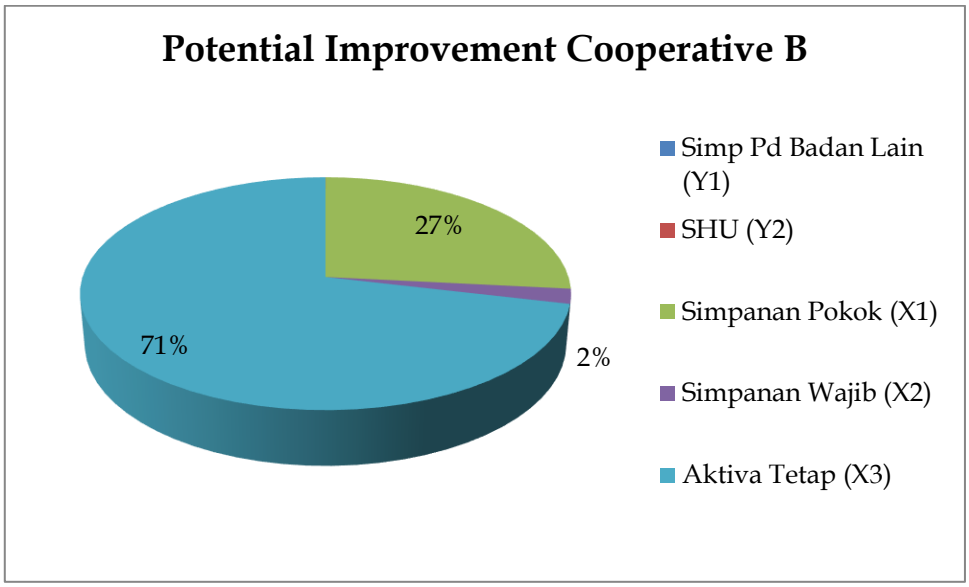

Figure 7: Potential Improvement of Cooperative Islamic Boarding Schools B

Similar to the Islamic boarding school cooperative A, in the potential improvement of the Islamic boarding school cooperative B, it is known that if the Islamic boarding school cooperative B wants to achieve optimal efficiency, fixed assets need to be reduced by 71%, mandatory savings are reduced by 2%, and principal savings are reduced by 27%. It can be concluded that the biggest cause of inefficiency in the pesantren B cooperative comes from the input variable, namely fixed assets.

CONCLUSION

This study aims to analyze and measure the efficiency of pesantren A and B cooperatives, as well as compare the efficiency levels of the two cooperatives during the 2014-2021 period using Data Envelopment Analysis (DEA). Based on the results of the research obtained, there are several findings, namely the level of efficiency of the cooperatives of Islamic boarding schools A and B has fluctuated from year to year. Then when compared, the level of efficiency of cooperative B is higher than that of Islamic boarding school cooperative A. On the CRS and VRS assumptions, cooperative A has an average efficiency of (0.414) and (0.565). Meanwhile, pesantren B cooperatives have efficient averages (0.811) and (0.870). Furthermore, during the Covid-19 pandemic the efficiency of cooperative A tended to be stable while the efficiency of cooperative B showed an increase, even though in the 2020 period the efficiency level had decreased.

In the analysis of the potential improvement of pesantren A and B cooperatives in the 2021 dataset. The potential improvement graph represents if the pesantren A cooperative wants to achieve optimal efficiency, then the output variable, namely SHU, needs to be increased by 46%. As for the input variables, namely principal savings reduced by 35%, mandatory savings reduced by 7%, and fixed assets decreased by 12%. Furthermore, for pesantren B cooperatives, fixed assets need to be reduced by 71%, mandatory savings are reduced by 2%, and principal savings are reduced by 27%. It can be concluded that the biggest cause of inefficiency in pesantren A cooperative is SHU, while in pesantren B cooperative is fixed assets.

Thus, it is hoped that cooperatives will pay more attention to the level of efficiency by making improvements to sources of inefficiency. In addition, cooperatives can also improve the quality of their human resources, conduct market research regarding community preferences for Islamic boarding schools cooperatives, and innovate cooperative products. Especially on the regulator side, to further support the development of Islamic boarding school cooperatives in increasing their professionalism, increasing the trust of cooperative customers by procuring adequate regulations, and paying attention to the quality of human resources owned by Islamic boarding schools. This research has limitations, including the small sample used, the research year is still limited until 2021, and this research does not deepen the causes of inefficiency or those that affect inefficiency in Islamic boarding school cooperatives in depth. So that for further research can further develop this research, especially on aspects that affect the inefficiency of cooperatives. Further research can also use the DEA Two Stage method, in-depth interviews, and other relevant methods to obtain more comprehensive results.

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