

Measuring Productivity of Pesantren Cooperative using Malmquist Index

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This research aims to measure the level of productivity of Islamic boarding school cooperatives in Indonesia during the period from 2013 to 2021. The method employed in this study is the Malmquist Index Productivity (MPI). The research findings reveal fluctuations in the productivity trends of Islamic boarding school cooperatives from year to year. Furthermore, the study uncovers a significant decrease in the level of productivity of these cooperatives during the Covid-19 pandemic. The average productivity score of Islamic boarding school cooperatives throughout the research period indicates an overall decrease of 0.614. This decrease is predominantly attributed to a decline in the average technology change (TECHCH) with a value of 0.616 and a reduction in the change in efficiency (EFFCH) with a value of 0.998. Individual analyses show that Cooperative B exhibits the highest productivity value compared to Cooperative A. However, both Cooperative A and Cooperative B are more significantly influenced by changes in efficiency in determining their productivity levels.

Keywords: Pesantren Cooperative, Productivity, MPI, BMT

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INTRODUCTION

In Indonesia, the development of cooperatives has increased the number of active cooperatives in the last three years. Based on data from the Ministry of Cooperatives and Small and Medium Enterprises (Kemenkopukm), in 2021 there were around 127 thousand active cooperative units, with a business volume of 182 trillion rupiah. This is a significant increase when compared to 2019 and 2020, where the number of active cooperatives was around 123 thousand units with a business volume of 154 trillion and 174 trillion rupiah, respectively. Based on data compiled by Kemenkopukm the island of Java is the region with the most cooperatives in Indonesia. This figure is quite lame when compared to other regions. The first place is West Java with 16 thousand cooperatives, followed by East Java and Central Java with 14 thousand and 12 thousand active cooperative units respectively.

The impressive development of cooperatives shows their important role in empowering the local economy and increasing community participation in economic activities. The success of cooperatives must be supported by competent human resources so that the increase in active cooperative units continues consistently. In this context, the emphasis on utilizing pesantren human resources (santri) as a potential resource for cooperatives in Indonesia is a great opportunity. Pesantren, with its focus on religious and cultural education, can be a source of human resources with strong values of honesty, hard work, and leadership. With the right training and support, these santri can play an important role in driving cooperatives and supporting economic development in various regions. This is in line with the objectives of education in Islamic boarding schools as expressed by Mastuhu (1994).

Pesantren is an educational institution based on Islamic religious law that has long existed in Indonesia, apart from functioning as an educational institution, it also acts as a social and economic institution (Sulaiman et al., 2018). (Sulaiman et al., 2018). According to Rizal (2011) pesantren is the oldest Islamic education system in Indonesia that still maintains the local wisdom of the archipelago and is able to adopt modern systems simultaneously without abandoning Islamic religious principles. Some pesantren in Indonesia generally have business units. The development of business units in pesantren can be seen from the development of their businesses, both on a small and large scale. The cooperative business is aimed at fulfilling the daily

needs of the students. Generally, the management of pesantren cooperatives is managed by the students themselves, led by a chairman and supervised by the boarding school management. (Al-Asror et al., 2021).

The development of Islamic boarding schools at this time, not only teaches religious education, but has become a social and economic institution by providing cooperative and entrepreneurial knowledge and skills in Islamic boarding schools. (Sulaiman et al., 2018). This makes pesantren cooperatives required to develop strategies that are able to create competitive advantages and operate efficiently in the face of industrial competition. As is known, measuring the productivity of cooperatives, especially pesantren cooperatives, is very important so that stakeholders such as practitioners (santri) and regulators can evaluate and develop future strategies to maintain stability and advance the pesantren cooperative industry in Indonesia.

However, research that raises information related to the productivity of pesantren cooperatives is still very limited. As far as the author's observation, there is no research that specifically examines the level of productivity of pesantren cooperatives in Indonesia during the period 2013 to 2021. Some previous studies predominantly focused on the level of productivity of formal financial institutions such as banks. As research Hamidi & Rusydiana (2019) which examines the efficiency and productivity of Islamic banks and conventional banks in 2011-2018 using the DEA and MPI approaches. Firmansyah (2019) measured the productivity of Islamic banks in Indonesia from 2013 to 2017 using the MPI method. Another study by Shah et al. (2019) which examines the efficiency and productivity of sustainable banks using DEA and MPI methodologies for 9 years (2010-2018). As-Salafiyah (2023) examines the productivity of BPR and BPRS in West Java during the period 2016-2021.

Although the productivity of formal financial institutions such as banks has been the focus of previous studies, research specifically examining pesantren cooperatives is still rare. This reflects the great potential for further exploration in the field of pesantren cooperatives. Therefore, this study attempts to analyze the productivity of pesantren cooperatives in Indonesia by taking several samples of pesantren cooperatives' financial statements. By using a similar approach, namely the Malmquist Productivity Index. This research can be an important contribution in understanding the extent to which pesantren cooperatives have achieved their productivity in

supporting the local economy and education. As such, this research will make a valuable contribution in broadening the understanding of the role of pesantren cooperatives in the Indonesian economy and the extent to which their productivity can be improved. In addition, this research can also provide a basis for better policy making and the development of best practices in supporting pesantren cooperatives in the future.

LITERATURE REVIEW

Islamic boarding schools are educational institutions that implement an Islamic sharia-based curriculum (Almuin et al., 2017). They use classical sources of Islamic teachings, such as Arabic books written by early Muslim scholars. The students live together in dormitories and worship in a mosque that is usually inside the pesantren. Kyai, who is a teacher and leader in the Islamic context, plays an important role in guiding students. In brief, a boarding school is an educational institution that creates competent students (sholihin sholihat), which means becoming a perfect human being who is able to choose and understand rights and obligations well. (Thahir, 2014).

In addition to the educational aspect, pesantren also have an economic dimension. In the context of Islamic education, pesantren is a medium that can be used to shape the character of students to become entrepreneurs. Recently, Islamic educational institutions such as pesantren have also highlighted the importance of entrepreneurship education for their students. (Maulida, 2022). Usually, pesantren have an independent business unit or what is called a cooperative that aims to meet the daily needs of the students. (Al-Asror et al., 2021). Republic of Indonesia Law No. 25 of 1992 concerning Indonesian Cooperatives defines a cooperative as a business entity consisting of individuals or cooperative legal entities by basing its activities on cooperative principles as well as a people's economic movement based on family principles.

In its development, there is still very little literature that examines productivity in pesantren cooperatives. The strongest reason is the availability of financial reports owned by cooperatives in each pesantren. Nevertheless, some studies have tried to focus on the study of pesantren cooperatives, such as those conducted by Fitri & Faezal (2023) who analyzed the financial performance of the Al-Muthmainnah boarding school cooperative in 2019-2020 by looking at the financial ratios of profitability, liquidity and

solvency. The results showed that the liquidity analysis in 2019 amounted to 1.03, which means that the ability of the boarding school cooperative to pay current debt was 103%, while in 2020 there was a decrease of 80% from the previous year. Solvency analysis in 2019 amounted to 470%, indicating that the pesantren cooperative was able to fulfill both long-term and short-term obligations, while in 2020 the achievement result was 370% down from the previous year. The resulting Rentability Analysis in 2019 amounted to 0.9%, indicating that the pesantren cooperative earned a profit of 0.9% of the capital used, while in 2020 the profit obtained was 1.9%. Overall, the three financial performances (profitability, liquidity and solvency) still have room for improvement in order to achieve the expected targets.

Sulaiman et al. (2018) highlighted the strategy of pesantren cooperatives in the economic empowerment of santri in El Bayan District, Cilacap, Central Java Province, Indonesia. To analyze this situation, the study used SWOT analysis, which identifies the strengths, weaknesses, opportunities, and threats faced by pesantren cooperatives. The results showed that the strategy of pesantren cooperatives in the economic empowerment of santri has a very important role. The proposed approach is to improve and enhance pesantren cooperative institutions, membership management, management stewardship, financial management, organization and partnership management, and development management.

A number of studies examining productivity have been conducted in economics, especially in the context of financial institutions. One example is a study conducted by Shah et al. (2019). The study evaluated the efficiency and productivity of sustainable banks using DEA and MPI methodologies for 9 years (2010-2018) and compared the performance of sustainable banks with banks that do not apply sustainable principles. The results show that banks that apply sustainable principles tend to be more efficient and productive. External and internal factors influence the productivity of both sustainable and conventional banks.

Firmansyah (2019) measuring the productivity of Islamic banks in Indonesia for the period 2013 to 2017. The method used is the malmquist productivity index. The results showed that in 2014 was the most productive period for Islamic banks in Indonesia, the bank that most consistently experienced an increase in productivity was Bank Syariah Mandiri, the bank that experienced the most productivity decline was Bank

Victoria Syariah, the bank that was most able to increase its productivity was Bank Muamalat followed by Bank Syariah Mandiri.

In addition, there are several other studies that also evaluate productivity, especially in an economic context, such as research by Hamidi & Rusydiana (2019), Tyas & Rusydiana (2020), Kataoka (2020), Sukmaningrum et al. (2022), As-Salafiyah (2023). These studies can also provide valuable insights in understanding productivity in different areas of the economy. The results of such studies allow revealing the patterns and factors that influence productivity in diverse economic contexts.

RESEARCH METHOD

This research is a descriptive quantitative study that applies the Malmquist Productivity Index (MPI) method. This research involves quantitative data analysis and analytical research to reach strong conclusions. A non-parametric approach is used, which tests the research object in the population without relying on certain parameter assumptions. This research focuses on a dataset of pesantren cooperatives in Indonesia, with a research period from 2013 to 2021, covering the time before and during the Covid-19 pandemic.

Two pesantren cooperatives were used as research objects based on the availability of financial statement data during the research period. The data used were sourced from financial statements taken from the official websites of each pesantren. The analysis involved three input variables, namely Principal Deposits (X1), Mandatory Deposits (X2), and Fixed Assets (X3), as well as two output variables, namely Deposits to Other Entities (Y1) and Residual Income (Y2). The main purpose of using the Malmquist Productivity Index (MPI) method is to measure the level of productivity of pesantren cooperatives.

MPI is an analytical tool used to measure productivity in businesses, including financial institutions. The method was first developed by Sten Malmquist in 1953 and later updated by Caves in 1982. MPI allows the comparison of production technologies in measuring output, input, and productivity indices. In addition, this method distinguishes two aspects: the catch-up effect, which measures the change in relative efficiency between two periods, and the frontier shift effect (innovation effect), which measures the change

in technology and the combination of inputs and outputs between two periods (Caves et al., 1982). (Caves et al., 1982).

In this study, the MPI productivity index calculation used DEAP 2.1 software as an analytical tool. The productivity of pesantren cooperatives is measured under the assumption of Variable Returns to Scale (VRS) with a focus on output reflected in Total Factor Production (TFP) growth. Changes in the level of productivity (Total Factor Productivity Change - TFPCH) are decomposed into two factors: changes in technology (TECHCH) and changes in efficiency (EFFCH). The analysis also divides efficiency change into two components: pure efficiency change (PECH) and scale change (SECH).

In the overall analysis, factors affecting productivity change are reflected through the values of the efficiency change index (EFFCH) and technology change index (TECHCH). In addition, the pure efficiency change index (PECH) and the scale change index (SECH) are used to identify the causes of changes in the efficiency index (EFFCH). The total factor productivity (TFP) value illustrates the change in the overall productivity index.

ANALYSIS

Productivity of Pesantren Cooperatives during the Observation Period

Productivity change factors can be identified through the Efficiency Change Index (EFFCH) and Technology Change Index (TECHCH) values. Meanwhile, the Pure Efficiency Change Index (PECH) and Scale Efficiency Change Index (ECH) are used to determine the cause of changes in EFFCH. Furthermore, the value of Total Factor Production (TFP) is intended to see any changes in the index. If the value of $M > 1$, then it explains an increase in productivity, and vice versa, where if $M < 1$ indicates a decrease in productivity value. If $M = 1$ then there is no increase in productivity.

The table below explains the results of the analysis using the Malmquist Productivity Index (MPI) of the Pesantren Cooperative which is the object of observation in this study.

Table 1. Average Malmquist Index Score of Pesantren Cooperatives per Year

Year	effch	techch	pech	sech	tfpch
2013-2014	0,987	0,816	1,000	0,987	0,805
2014-2015	1,013	0,834	1,000	1,013	0,845
2015-2016	0,998	0,837	1,000	0,998	0,836
2016-2017	0,604	13,627	0,819	0,738	8,232
2017-2018	1,659	38,034	1,221	1,358	63,099
2018-2019	0,967	0,383	0,989	0,978	0,371
2019-2020	1,034	0,000	1,011	1,023	0,000
2020-2021	0,983	2,158	1,000	0,983	2,120
Mean	0,998	0,616	1,000	0,998	0,614

The table above explains the changes in the total productivity (Tfpch) of the Boarding School Cooperatives as well as the factors that influence it, namely technological changes (Techch) and efficiency changes (Effch) during the observation period. From the MPI results on two pesantren cooperatives, it can be concluded that the productivity of pesantren cooperatives fluctuates from year to year. The average score results show that the productivity value of the Pesantren Cooperatives decreased (0.614) which was equally caused by a decrease in technological change (0.616) and efficiency change increased (0.998). However, when viewed based on the average, it explains that technological changes dominantly contribute to the decline in the productivity of Islamic Boarding School Cooperatives.

In the period 2013-2016, the average productivity level of Islamic Boarding School Cooperatives decreased, which can be seen from the value of tfpch in each period in order is (0.805), (0.845), and (0.836). The decline in productivity in the three periods was dominantly caused by the decline in technological change (techch) with each value in each period, namely (0.816), (0.834), and (0.837). As for changes in efficiency (effch), only in the 2014-2015 period showed an increase (1.013), and in the 2013-2014 and 2015-2016 periods changes in efficiency decreased with the value of efficiency changes (0.987) and (0.998).

Furthermore, the results in the 2016-2017 and 2017-2018 periods, the level of productivity of the Islamic Boarding School Cooperative has increased, with tfpch values of (8.232) and (63.099). The increase

in productivity in that period was due to technological changes (techch) also showing an increase, namely with the value of each period (13.627) and (38.034). Then for changes in efficiency in the 2016-2017 period decreased (0.604), while in the 2017-2018 period changes in efficiency showed an increase (1.659). So, it can be concluded that technological change has an important role in increasing the productivity of pesantren cooperatives.

Furthermore, in the 2018-2020 period, the level of productivity of pesantren cooperatives again showed a significant decline. This can be seen from the tfpch value in the 2018-2019 period, namely (0.371) and 2019-2020, namely (0.000). The decrease in productivity in both periods was dominantly caused by a decrease in technological change, with a value of (0.383) in the 2018-2019 period, and (0.000) in the 2019-2020 period. Then, the change in efficiency also decreased in the 2018-2019 period with a value of (0.967), while in the 2019-2020 period the change in efficiency showed an increase (1.034).

Finally, in 2020-2021 the productivity level increased again (2.120) which was influenced by an increase in technological change (2.158), although the efficiency change decreased (0.983). It can be concluded that in the 2020-2021 period, technological change plays an important role in increasing the productivity of Islamic Boarding School Cooperatives.

If analyzed further, the productivity trend of the Pesantren Cooperatives can be seen in the figure below.

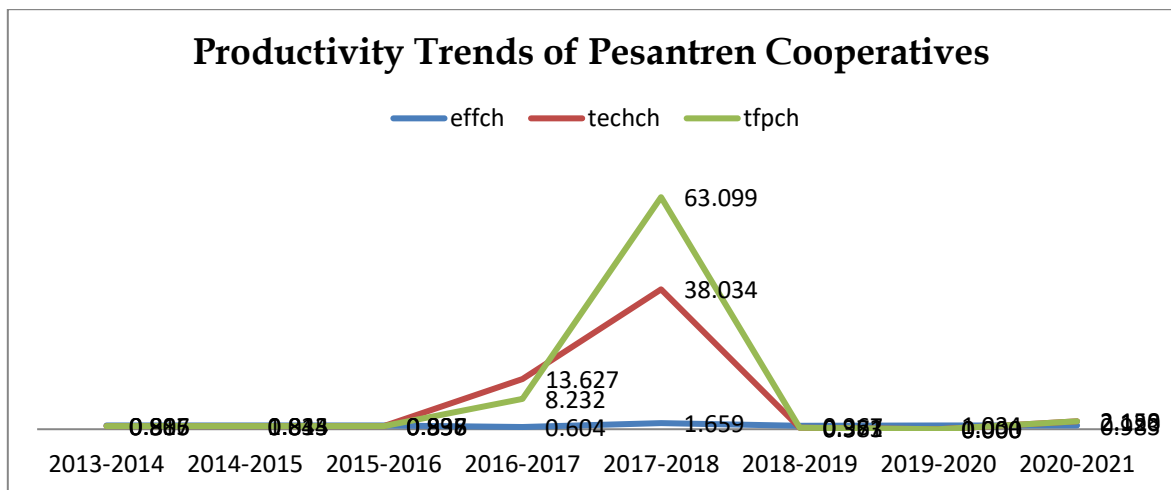


Figure 1. Productivity Trends of Pesantren Cooperatives

Based on the figure above, it can be concluded that the productivity trend of the Pesantren Cooperatives fluctuates from year to year. The trends of tfpch, effch and techch have almost similar patterns. It is known that, in the 2013-2016 period, tfpch and techch experienced a decrease in productivity levels, which then increased in the 2016-2017 period to the 2017-2018 period. Judging from the trend of tfpch or the level of productivity, in the 2017-2018 period there was the highest increase in productivity throughout the study period. The same thing was also found in the techch trend or technological changes which also showed the highest increase in the same period, 2017-2018. As for efficiency changes, the increase can be seen in the 2014-2015 period and the 2017-2018 period.

Then, effch again showed a significant decline in the 2018-2019 period, which then increased in the next period, until finally it decreased again in the 2020-2021 period. Meanwhile, techch and tfpch, from the 2018-

2020 period, there was a significant decline, until finally it increased again in the 2020-2021 period. Overall, it can be concluded that technological change (techch) plays an important role in the level of productivity of Islamic Boarding School Cooperatives. Therefore, Pesantren Cooperatives must begin to focus on the use of technology in each of their operations. This is intended so that efficiency can be achieved and productivity levels can increase.

Productivity of Pesantren Cooperatives during the Covid-19 Pandemic

The phenomenon of the Covid-19 pandemic at the end of 2019 until it spread in Indonesia in early 2020 certainly had a global impact not only on the health sector but also on the economic and social sectors of society, especially in Islamic Boarding School Cooperatives. For this reason, the following analysis explains the productivity of the Pesantren Cooperatives during the Covid-19 pandemic.

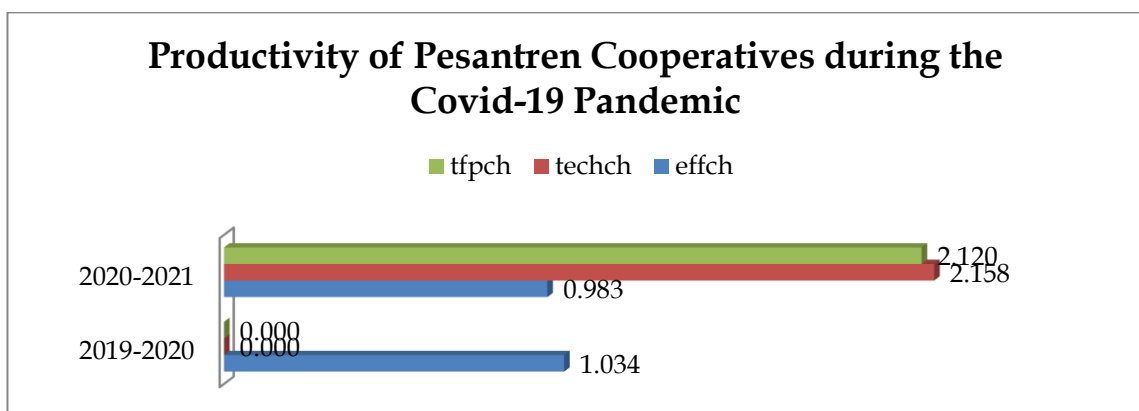


Figure 2. Productivity of Pesantren Cooperatives during the Covid-19 Pandemic

Based on Figure 2 above, it can be concluded that the Covid-19 pandemic has a significant impact on

the productivity level of pesantren cooperatives. This is evidenced by the beginning of the 2019-2020 period,

where Covid-19 began to spread massively in Indonesia, showing that the level of productivity of pesantren cooperatives experienced a significant decline. The decrease in productivity in this period was caused by a decrease in the level of technology use (techch) to a value of (0.000), although the level of efficiency change increased (1.034). Then, in the 2020-2021 period, the productivity level increased significantly due to the increase in technological change

(2.158). Meanwhile, the change in efficiency shows a decrease (0.983). So it can be concluded that during the Covid-19 pandemic, technology has a crucial role in increasing the productivity of pesantren cooperatives.

Summary of Average Malmquist Index of Pesantren Cooperatives in Indonesia

Table 2. Average Productivity of Boarding School Cooperatives 2013-2021

Table 2. Average Productivity of Pesantren Cooperatives 2013-2021

Firm	effch	techch	pech	sech	tfpch
Cooperative A	0,996	0,386	1,000	0,996	0,385
Cooperative B	1,000	0,981	1,000	1,000	0,981
Mean	0,998	0,616	1,000	0,998	0,614

Based on the table, the average productivity of Islamic Boarding School Cooperatives during the study period showed a decrease in productivity (0.614). This decrease in productivity was influenced by a decrease in the average value of technological change (techch) with a value of (0.616) and efficiency change (effch) with a value of (0.998). Furthermore, the analysis conducted individually on Pesantren Cooperatives, it can be concluded that of the two pesantren cooperatives that became the object of this study, none showed an increase in productivity.

However, when viewed from the highest value, Cooperative B has the highest productivity value of (0.981), with the value of technological change (0.981) and efficiency change (1.000). In Cooperative B, efficiency changes are more dominant in influencing productivity levels. Then, in Cooperative A, the productivity level shows a value of (0.385), with technological change (0.386) and efficiency change (0.996). Similar to Cooperative B, in Cooperative A, efficiency changes have a dominant role in influencing productivity levels.

FINDINGS

The results of this research reveal several notable findings with important implications. One prominent finding is the fluctuation in the trend of Pesantren Cooperative productivity from year to year. However, more importantly, this study indicates a significant decreasing trend in productivity during the COVID-19 pandemic. This decline is more influenced by changes in efficiency rather than changes in technology. In other words, operational efficiency

factors played a more substantial role in the decline in Pesantren Cooperative productivity during this period compared to technological advancements.

Several factors that can explain this decrease in efficiency include rapid changes in business processes, the need to adapt to new technologies, and operational constraints resulting from the pandemic (As-Salafiyah, 2023). Previous studies, as mentioned by Abdul-Majid et al. (2010), As-Salafiyah (2023), Sufian & Noor, (2009), have emphasized the importance of efficiency in the context of financial institutions. In the context of Pesantren Cooperatives, efficiency is key to maintaining productivity and competitiveness. López & Marcuello (2006) found that the decrease in efficiency change among cooperatives might be due to cooperatives still focusing on traditional sales activities and managing capital and assets.

Furthermore, the research results also indicate that Cooperative B has a higher level of productivity compared to Cooperative A. However, in both Cooperative A and Cooperative B, changes in efficiency have a more significant impact on productivity levels. This better performance may be attributed to the adoption of a more efficient business model, success in adopting new technologies, and a strong focus on Sharia principles (Eliza & Susanti, 2020). Additionally, Syamni & Abd Majid (2016) stated that differences in efficiency between cooperatives could also be influenced by the level of professionalism of cooperative management, which may be higher in one cooperative compared to the other. According to Sukmaningrum et al. (2022), efforts to optimize efficiency levels can be achieved through the development of human resources and skills of

personnel working to keep up with industry-related changes. It's not easy to compete without competent workforce, especially in knowledge-based industries (Mansor & Radam, 2000).

The low efficiency changes in pesantren cooperatives are also influenced by technological changes. Therefore, the adoption of technology in pesantren cooperatives should consider several critical factors. First, the credibility of the cooperative institution must be well-maintained. By leveraging information technology, cooperatives can continue to provide services to their members, even in challenging situations like a pandemic, which, in turn, can maintain the trust of cooperative members. Second, cost is a factor that needs careful consideration. The implementation of information technology and service digitalization in cooperatives requires significant financial investment. Therefore, cooperatives need to carefully consider this cost aspect. Third, supportive conditions are crucial. Success in implementing digitalization of cooperative services requires support from all cooperative members and other stakeholders. Good technology alone is not enough, but support from all stakeholders in the cooperative is the key to the success of technology implementation in cooperative services (Rustariyuni, 2021). Considering these findings, pesantren cooperatives can take appropriate steps to improve their productivity while maintaining the integrity of the institution and meeting the needs of their members.

CONCLUSION

This study aims to measure the level of productivity of pesantren cooperatives in Indonesia during the period 2013 to 2021 using the Malmquist Index Productivity (MPI) method. The results revealed that there were fluctuations in the productivity trend of Islamic boarding school cooperatives from year to year. Furthermore, during the Covid-19 pandemic, the productivity level of boarding school cooperatives experienced a significant decline. The average productivity score of the Pesantren Cooperatives throughout the study period showed an overall decrease (0.614). This decrease in productivity is mainly due to a decrease in the average change in technology (TECHCH) with a value of 0.616, and a decrease in efficiency change (EFFCH) with a value of 0.998. This shows that the decrease in productivity of pesantren cooperatives is more influenced by changes in efficiency than changes in technology. In other words, the efficiency factor contributes more to the decline in

productivity of pesantren cooperatives than the technology factor. Furthermore, individual analysis shows that cooperative B has the highest productivity value compared to cooperative A. However, both cooperative A and cooperative B have the highest productivity value. However, in both cooperative A and cooperative B, changes in efficiency are more dominant in affecting productivity levels. This indicates that the operational efficiency of cooperatives has a greater role in influencing productivity than technological progress in the study period. For the next step, further study can calculate the efficiency performance of pesantren cooperative for more comprehensive performance measurement (Ula & Rahayu, 2022; Rohmatullah, 2022; Putri, 2022).

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