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Evaluating the Impact of Cooperative Services on Dairy Farm Performance in North Cianjur: An Importance-Performance Analysis Approach

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Abstract: The Foot-and-Mouth Disease (FMD) outbreak has worsened the performance of dairy farming and Milk Producers Cooperative (KPS). Therefore, this study aims to evaluate the effectiveness of cooperatives in supporting dairy farmers in North Cianjur, Indonesia. Using Importance-Performance Analysis (IPA), we assess the role of cooperative services in the performance of its dairy farming members. The results indicate that livestock health and reproduction services are highly prioritized, while education and training programs need improvement, along with a significant relationship between the performance of cooperative services and the businesses of its members. These findings emphasize cooperatives' importance in sustaining small-scale dairy farming performance and provide recommendations for service enhancement.

Keywords: Dairy cooperative; dairy farm performance; importance-performance analysis, service quality

Introduction

Livestock, particularly dairy farming, plays a crucial role in the economic growth of many low-and middle-income countries, including Indonesia (Asmara et al., 2016; Jahroh et al., 2020). In 2022, Indonesia witnessed a substantial contribution of 178.1 trillion IDR from the livestock sector to its Gross Domestic Product (GDP), marking a significant increase from the previous year. This growth is further fueled by the rising national milk consumption and governmental initiatives aimed at achieving food independence (Asmara et al., 2017). However, the dairy sector in Indonesia is predominantly characterized by small-scale farms, often operating with traditional methods and family-based labor (Guntoro et al., 2016). These small-scale producers often grapple with challenges such as high transaction costs, limiting their access to diverse marketing channels, and hindering their overall business performance (Hao et al., 2018; Ma & Abdulai, 2016).

To address these challenges and enhance the welfare of dairy farmers, Milk Producer Cooperatives (MPCs) have emerged as a vital institutional mechanism in Indonesia. MPCs aim to reduce transaction costs for farmers by pooling resources and facilitating collective action, thereby improving production efficiency and market access (Mutonyi, 2019). The existence of this farmer organizations also reduced the exploitation and opportunistic behavior of traders buying agricultural produce from members of the organization (Sathapatyanon et al., 2018). They offer several benefits, including being a source of creativity and innovation (Rusko et al., 2017). The

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decision of farmers to join MPCs is influenced by various factors, including proximity to milk sales points, household demographics, livestock ownership, membership fees, involvement in local governance, and access to training programs (Habiyaremye et al., 2023). While previous research has shown the positive impacts of cooperative membership on business liquidity and production (Lin et al., 2022), there are also concerns about potential limitations in price negotiation and market flexibility for members (Chagwiza et al., 2016). Another aspect of farmers joining cooperatives is the requirement to develop and empowered community (Steiner & Farmer, 2018).

Milk Producer Cooperatives are a type of cooperative whose members are dairy farmers and aim to improve the welfare of their members. Cooperatives are formed to reduce farmers' transaction costs because they are done collectively, which can increase production and facilitate marketing (Mutonyi, 2019). In addition, distance to the nearest milk sales point, age of the household head, ownership of lactating and purebred dairy cows, membership fees, involvement in local government administration, and dairy farm management training also influence members' decision to join MPC (Habiyaremye et al., 2023).

The cooperative itself is an autonomous association of persons united voluntarily to meet common economic, social, and cultural needs and aspirations through jointly owned and democratically controlled enterprises ([IAC], 2022). This institution is also an associations that collect resources from people sharing the same interests (Ishak et al., 2020), engages in participatory decision-making (Jossa, 2014); and is democratically controlled to realize the goals of the members (Bouamra-Mechemache & Zago, 2015). Cooperatives further raise market stability and enhance services to farmers (Gerard et al., 2021).

Previous research shows that cooperative membership shows positive and significant liquidity results on member businesses (Ma & Huang, 2021). In addition, cooperative membership also has a positive and significant effect on production (Lin et al., 2022). According to Chagwiza et al (2016), cooperatives are strong in facilitating technological transformation and commercialization but weak in offering better prices. Cooperative membership reduces the likelihood that members will sell to other buyers, while non-members are more free to sell to other buyers. This may reduce the opportunity for member dairy farmers to earn more profit.

The prominence of small-scale dairy farms in Indonesia, often characterized by traditional practices and family-based labor, underscores the need for institutional support to enhance their productivity and profitability. Milk Producer Cooperatives have emerged as a potential solution, offering a range of services aimed at reducing transaction costs, improving market access, and providing technical assistance (Mutonyi, 2019). However, when the FMD outbreak struck in 2022, the effectiveness of these cooperatives in supporting dairy farm performance, particularly across different scales of operation, did not function as expected. Several weaknesses of the cooperatives are suspected to be contributing factors to this condition. This study seeks to address this gap by examining the MPC North Cianjur in Indonesia as a case study. The research will delve into the cooperative's financial performance, the socioeconomic characteristics of its members, the perceived quality of cooperative services, and the impact of these services on the business performance of member farms. By analyzing these factors, this study aims to provide a comprehensive understanding of the role of MPCs in empowering dairy farmers and fostering sustainable agricultural development.

The hypothesis is that the performance of cooperative services has a positive influence on the performance of farm business members in North Cianjur. Furthermore, the novelty of this research includes the relationship between cooperative services and the business performance of members, the identification of areas for improvement, and contextualization within the context of the FMD outbreak, as well as the uniqueness of the analytical approach used. All of these contribute significantly to the literature and practice regarding cooperatives and small-scale dairy farming in Indonesia.

Methods

The research was conducted at the MPC North Cianjur, located in the Cianjur Regency of West Java, Indonesia. This region was purposefully selected due to its prominence as a milk-producing area and the presence of an established cooperative institution specializing in dairy production. The study period spanned from March to June 2024, allowing for comprehensive data collection during the peak milk production season.

The collection of primary data serves as the foundation for this study, which employs a mixed methods approach. Interviews can provide in-depth insights and details related to the research topic (Jain, 2021). The population of cooperative member farmers consists of 120 individuals. By using Slovin's formula, the minimum sample size can be determined as follows:

$$n = \frac{N}{1+N\,e^2} \quad (1)$$

Where:
-n = sample size
-N = population size (120 individuals)
-e = margin of error (set at 10% or 0.1)

From the calculations, a sample size of 55 farmers was obtained. Since the population consists of two different groups, namely small-scale farmers and large-scale farmers, stratified random sampling was used to achieve a proportional representation from each group. The stratification criteria are based on the number of dairy cows owned by each farmer, where small-scale farmers (owning a maximum of 4 dairy cows) and large-scale farmers (5 or more dairy cows) are categorized. Ultimately, 44 small-scale farmers and 11 large-scale farmers were selected. In-depth interviews and structured questionnaires were then conducted with this sample.

The collected data were analyzed using descriptive analysis, Importance-Performance Analysis (IPA), profit analysis, and chi-square analysis. Descriptive analysis was used to describe the characteristics of the cooperative, member farmers and member dairy farms. Cooperative financial performance analysis is used to measure how capable the cooperative is of meeting its short-term and long-term obligations and how capable it is of generating profits from the business developed by the cooperative. Importance-Performance Analysis (IPA), a method introduced by Martilla & James (1977), and also by Wyród-Wróbel & Biesok (2017), was employed to gauge the perceived importance and performance of cooperative services from the perspective of member farmers. This analysis involved the use of a Likert scale ranging from 1 (very low) to 5 (very high) to assess both the importance of each service and the cooperative's performance in delivering that service. The IPA methodology has been widely applied in various fields, including marketing, transportation, and policy prioritization (Cao & Cao, 2017; Chaisomboon et al., 2020; Esmailpour et al., 2020; Putra, 2013; Xu et al., 2020; Zhang & Jia, 2019), and it provides valuable insights for decision-makers by identifying areas where improvements in service delivery may be needed.

In addition to IPA, profit analysis was conducted to evaluate the profitability of dairy businesses operated by cooperative member farmers. This analysis involved calculating profit levels and the revenue-to-cost (R/C) ratio, providing a clear picture of the economic viability of these businesses. Finally, chi-square analysis was employed to examine the relationship between the cooperative's service performance and the business performance of its members. This statistical test helped to determine whether there was a significant association between the two, shedding light on the extent to which the cooperative's services contribute to the success of its member farmers.

Chi Square analysis was used to analyze the relationship between the performance of the cooperative's services (from the perspective of members) and the business performance of livestock cooperative members. Hypotheses for testing were:
Ho : The performance of cooperative service and the performance of farm business members is independent (There is no association).
Hi : The performance of cooperative service and the performance of the livestock business members are dependent (There is an association).
Territory criticism for hypothesis testing was:
If $\chi^2_{account} > \chi^2_{\alpha(v)}$ then Ho was not accepted
If $\chi^2_{account} < \chi^2_{\alpha(v)}$ then Ho was accepted
(α= significance level, v= degree of freedom)

The formula to calculate Chi Square was as follows:

$$\chi^2_{account} = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij}-E_{ij})^2}{E_{ij}} \quad (2)$$

where:
O_{ij} = the frequency of the observation in row i and column j
E_{ij} = the theoretical frequency (expectations) in row i and column j
To calculate the theoretical frequency use the formula:

$$e_{ij} = \frac{(T_{i\cdot})(T_{\cdot j})}{T_{\cdot\cdot}} \quad (3)$$

where:
$T_{i.}$ was the total of frequency in the row i.
$T_{.j}$ was the total of frequency in the column j.
T. was the total frequency of observations.

Results and Discussion

Profile and Financial Performance of North Cianjur Cooperative

The Milk Producer Cooperative (MPC) North Cianjur, located in the Cipanas District of Cianjur Regency, West Java, Indonesia, operates as a vertically integrated dairy cooperative. It engages in a comprehensive range of activities spanning the entire dairy value chain, from upstream milk production to downstream processing and marketing (Bijman et al., 2012). As of 2023, the cooperative boasts a membership of 120 dairy farmers, organized into distinct farmer groups, and collectively produces 3.0 to 3.5 tonnes of milk daily. In addition, there are around 20-30 more farmers who are potential members. This substantial production capacity underscores the cooperative's pivotal role in the local dairy economy.

MPC North Cianjur's business activities encompass a diverse portfolio. The cooperative not only facilitates the production of raw milk but also engages in the

processing of this milk into various value-added dairy products, thereby capturing additional value within the supply chain (Chagwiza et al., 2016). Recognizing the importance of supporting its members' production capabilities, the cooperative provides essential livestock production facilities, including feed and veterinary equipment. Moreover, MPC North Cianjur offers crucial services such as artificial insemination and animal health services, ensuring the well-being and productivity of its members' dairy herds. The cooperative's commitment to member welfare extends to the financial realm, with a dedicated savings and loans division that caters to the financial needs of its members (Ma & Huang, 2021). Additionally, the cooperative operates a revolving dairy cattle scheme, enabling members to access financing for acquiring dairy cattle, thereby fostering the growth and development of their dairy enterprises.

The financial report of the cooperative from 2020 to 2023 exhibits notable fluctuations in total assets, liabilities, equity, and net income. Figure 1 illustrates the cooperative's asset values spanning from 2020 to 2023, categorized into current assets and fixed assets. Based on the graph data, the cooperative's assets, comprising current and fixed assets, demonstrate intriguing dynamics over this period. Current assets experienced significant fluctuations, peaking in 2020 but sharply declining in 2021. However, they rebounded in subsequent years, albeit not reaching the 2020 levels, possibly reflecting changes in the cooperative's liquidity management or adaptive asset strategies in response to market conditions.

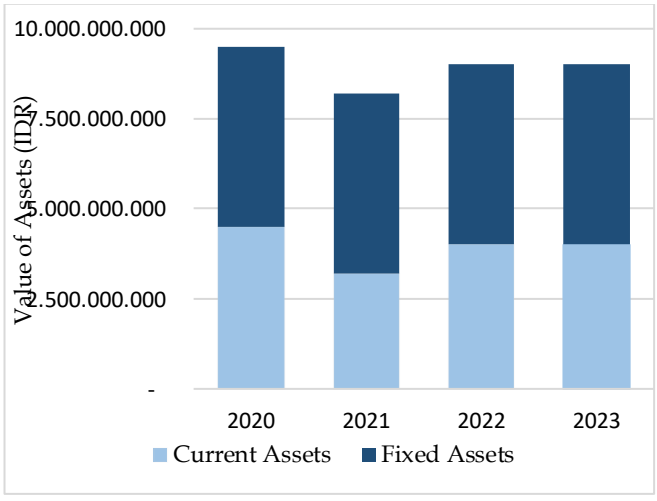


Figure 1. Assets Value of MPC (2020-2023)

Figure 2 presents the cooperative's liability data segmented into short-term and long-term liabilities. As depicted, short-term liabilities consistently decreased from 2020 to 2023, indicating efforts to reduce short-term obligations. Long-term liabilities showed a more varied trend, with a significant decline from 2020 to 2021, followed by an increase in 2022 and a slight decrease in 2023.

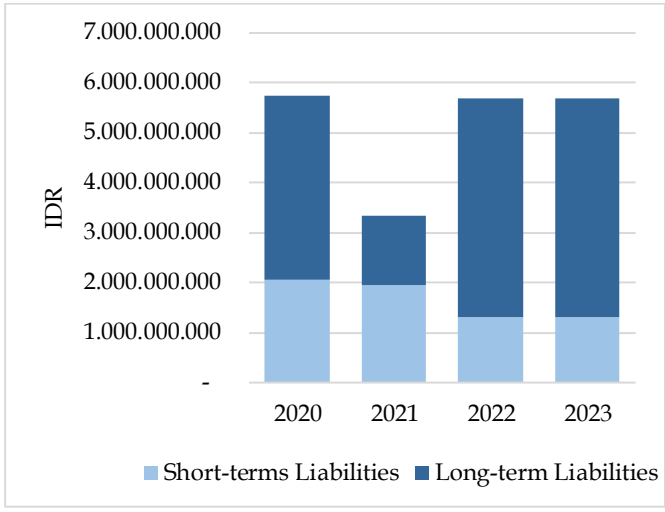


Figure 2. Liabilities of MPC (2020-2023)

Figure 3 displays the total equity of the cooperative. Based on the data, the cooperative's equity showed a stable increase from 2020 to 2023, reflecting its ability to consistently enhance value for members. The rise in equity also indicates successful maintenance of profitability and reinvestment of profits to fortify its financial standing. Stable equity is crucial for instilling member confidence in the cooperative's financial health.

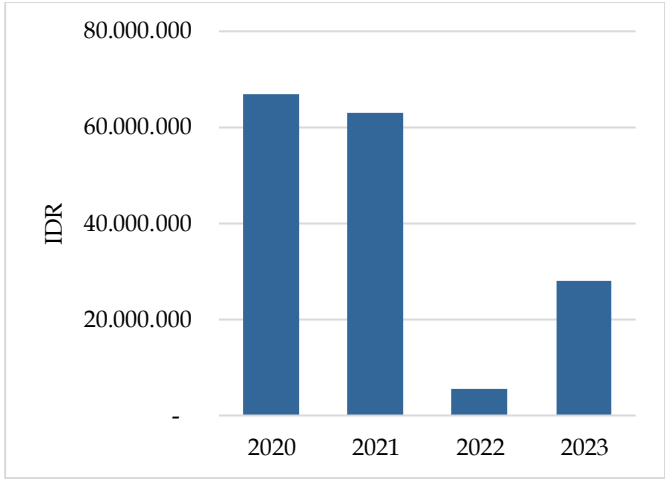


Figure 3. Equity of MPC (2020-2023)

Figure 4 illustrates the net income earned by the cooperative from 2020 to 2023. The data reveals significant fluctuations during this period. Net income was relatively high in 2020 and 2021 but sharply declined in 2022 due to substantial increases in operating expenses and decreased productivity resulting from an outbreak of FMD, leading to a drastic reduction in milk production. These operational challenges significantly

affected the cooperative's income generation capacity for that year.

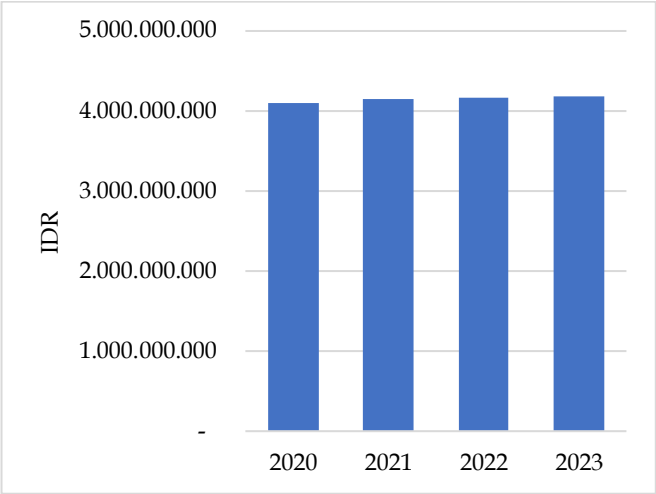


Figure 4. Net Income of MPC (2020-2023)

Farmer and Dairy Business Profile

Based on the scale of business, dairy farmers are divided into two classifications: small-scale farmers and large-scale farmers. The characteristics include average age, education level, and farming experience. There were 55 farmers who became respondents. The socioeconomic characteristics of dairy farmers can be seen in Table 1.

The average age of dairy farmers is at a productive age. According to Iriani (2005), at a productive age, it is expected to be able to reach peak productivity that develops the potential of each farmer. The education of dairy farmers varies. The higher the level of education of farmers, the more they are expected to be able to use their mindset, reasoning, attitudes and behavior in making every decision (Pamungkasih & Febrianto, 2021). In terms of livestock experience, the average total experience is 16 years. Livestock experience will make farmers more independent and skilled in managing their businesses and Hendrayani & Febrina (2009) stated that the lower the risk of failure.

Table 1. Socioeconomic Characteristics of Dairy Farmers

Description	Small Scale	Large Scale	Average
Average Age (years)	43.02	47.45	43.94
Education (%)			
Elementary School	60.47	45.45	57.41
Junior High School	23.26	9.09	20.37
Senior High School	11.63	9.09	11.11
College	4.65	36.36	11.11

Furthermore, the number of dairy cows owned will affect the amount of milk production produced and business income. The average level of livestock ownership maintained on a business scale can be seen in Table 2.

Table 2. Average livestock ownership level

Description	Small Scale	Large Scale
Male calf	0.84	1.18
Female calf	1.05	2.18
Heifers	0.81	1.55
Mature males	1.02	1.18
Young males	0.02	0.00
Lactating females	2.19	8.27
Dry-cage females	0.70	1.09
Total	6.63	15.45

The number of lactating cows greatly influences the efforts of farmers because it determines the amount of milk production produced. The more lactating cows owned, the more income the farmer will get, and vice versa (Hastuti et al., 2018). Variations in the number of livestock can provide an overview of milk production as in Table 3.

Table 3. Milk production demonstration

Description	Small Scale		Large Scale	
	1	2	1	2
Average production (liters/head/day)	9.96	11.31	11.98	12.10
Maximum production (liters/head/day)	13.58	14.22	13.80	12.17
Minimum production (liters/head/day)	7.81	8.65	7.67	7.94

Note: 1 = current year; 2 = last year

Based on the table, it is known that the average production per lactating cow per day tends to decrease compared to last year. This is because dairy farms are being hit by an outbreak of foot and mouth disease (FMD). FMD disease causes a decrease in udder function so that milk production cannot be optimal, reproductive function decreases and can cause death in infected livestock (Novitasari et al., 2023). In addition, Ansari-Lari et al (2017) stated that dairy cows infected with FMD result in a decrease in milk production of 5-8%. In addition, farmers are increasingly finding it difficult to meet input needs, especially green fodder and concentrate inputs, which are a major challenge.

Cooperative Service Performance from the Perspective of Members

The Dairy Farmer Cooperative of North Cianjur offers a comprehensive range of services to its members, aimed at supporting various aspects of dairy farming operations. One of the core services provided is the collection and marketing of dairy cow milk. This service

ensures that members have access to a reliable outlet for their milk, facilitating distribution and sales. Additionally, the cooperative supports members by offering the provision of feed inputs, supplying essential feed necessary for the health and productivity of their livestock. The cooperative also offers artificial insemination (AI) services to assist in improving the genetic quality of the herd. Alongside this, members can access medical treatment and disease prevention services to ensure the health and well-being of their cows. To further support herd management, the cooperative provides pregnancy screening services. This helps in monitoring and managing the reproductive health of the livestock. Members also benefit from technical guidance, receiving valuable information on best practices in dairy farming. Educational support is another key aspect of the cooperative's offerings, with member education and training programs available to enhance the skills and knowledge of the members. In addition to these services, the cooperative provides consultation services, offering expert advice and support tailored to the needs of individual members. Finally, the cooperative addresses financial needs through capital provision, which is part of the *LPDB* (Revolving Fund Management Institution) program that also includes policies to support food security (Onyiriuba et al., 2020). This service helps members secure the necessary funds for investing in their farming operations, whether for purchasing feed, expanding facilities, or other critical investments. Through these services, the Dairy Farmer Cooperative of North Cianjur supports its members in various aspects of dairy farming, contributing to the overall success and sustainability of their operations.

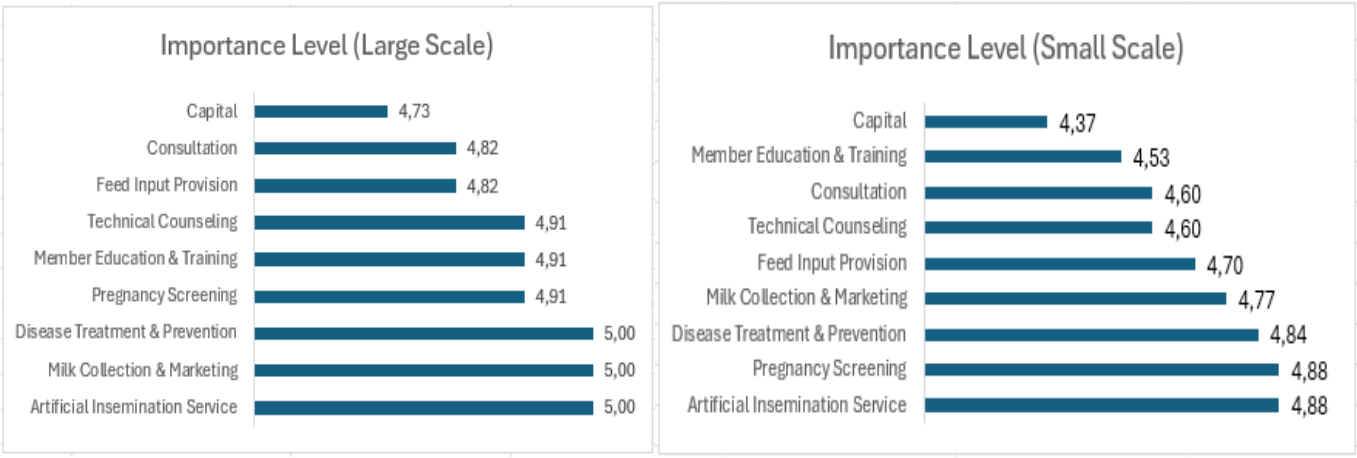


Figure 5. Level of importance of perceptions of small and large-scale dairy farmers

Based on Figure 5, it is known that the importance score of each cooperative service gets an average value of more than 4.0. This indicates that the nine services provided by the cooperative are considered important by both small-scale and large-scale member farmers. According to the assessment of small-scale dairy farmers, artificial insemination services and pregnancy screening services ranked the highest with scores of 4.88 each. This was followed by treatment and disease prevention services, milk collection and marketing, provision of feed inputs, and technical counseling. The low-scoring services are consultation, member education and training, and capital.

The low assessment of farmers regarding education and training may be due to some farmers not yet realizing the importance of education and training in improving their farm performance. This can lead to low participation and evaluation of these services. Meanwhile, assessing the level of importance of cooperative services according to large-scale dairy farmers, it is known that the services that are considered to have the highest level of importance are services in artificial insemination services, milk collection and marketing, and treatment and prevention of diseases, which have a score of 5. This is followed by services in pregnancy screening services, member education and training, and technical counseling. The relatively less important services are the provision of feed inputs, consulting services, and capital. Overall, the survey results show that services related to livestock health and reproduction received the highest priority, while capital services, although important, was considered less of a priority.

The level of service performance of milk producer cooperatives from the perspective of small-scale and large-scale farmers is presented in Figure 6. Based on this figure, it is known that there are differences in the results of the assessment of cooperative service performance by farmer households.

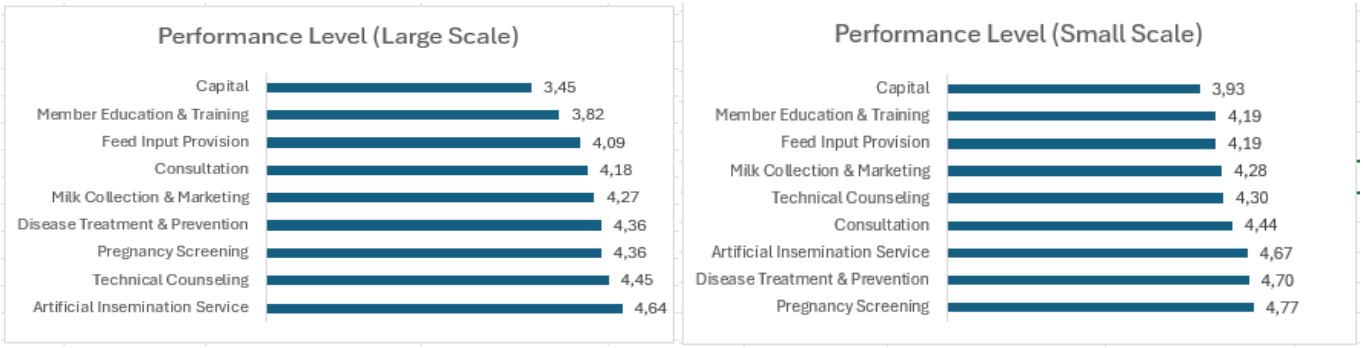
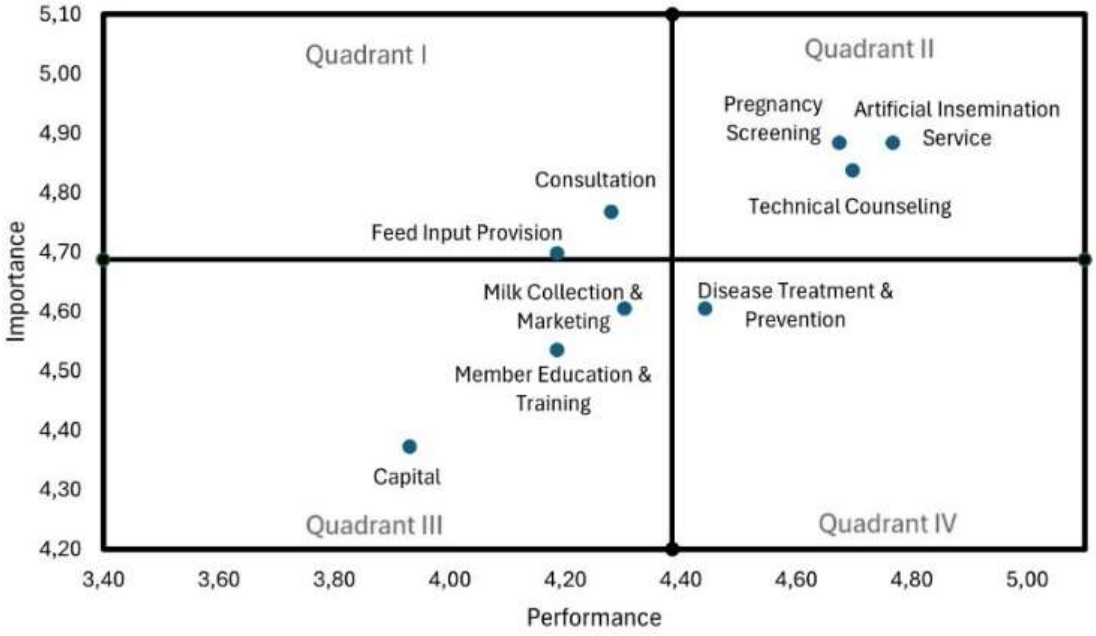


Figure 6. Service performance levels of milk producer cooperatives as perceived by small-scale and large-scale dairy farmers.

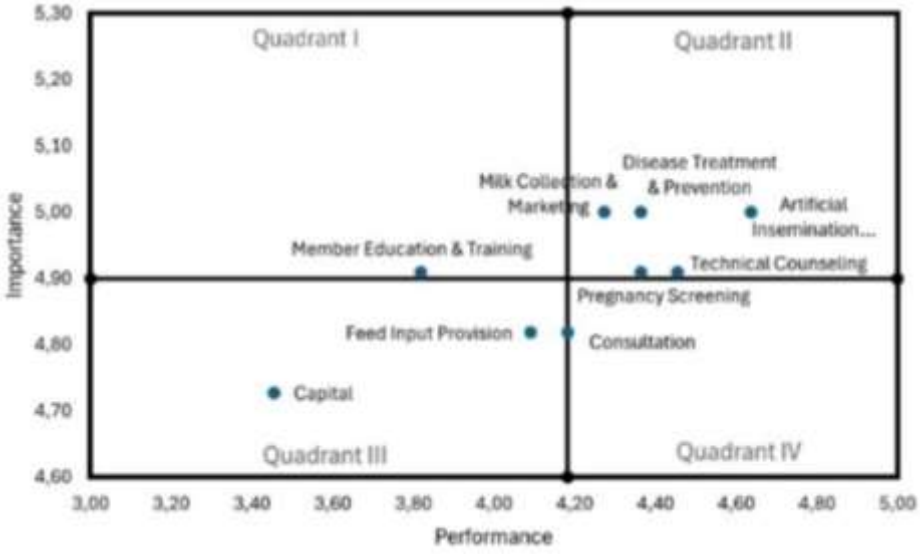
Based on this figure, according to small-scale dairy farmers, cooperative services that were rated as having relatively higher performance than other services were pregnancy screening, disease treatment and prevention, and artificial insemination services. This indicates that the performance of these services is considered very good and helpful. Then, the results of the performance assessment of the next cooperative services are consulting services, technical counseling, milk collection and marketing, and provision of feed inputs. The services that are considered to provide less than maximum service are member education and training services and capital.

Meanwhile, the performance of cooperative services according to large-scale dairy farmers showed that the services that achieved the highest scores were services in terms of artificial insemination, technical counseling, pregnancy screening, and disease treatment and prevention. This indicates that these services are very satisfactory. Then, the results of the performance assessment of cooperative services are followed by milk collection and marketing, consultation, and provision of feed inputs. Especially in marketing, the milk price shows the finding of Bairagi & Mottaleb (2021), who concluded that farmers participating in farmer organizations were technically more efficient. The services that are considered to provide less than maximum service are member education and training and capital, indicating that there is room for improvement in these areas.

Based on the level of importance and the level of performance of cooperative services, the relative position of each service in the IPA quadrant can be mapped. The assessment of small-scale dairy farmers and large-scale dairy farmers on the relative position of each service in the IPA quadrant is presented in Figure 7.



(a) Small scale



(b) Large Scale

Figure 7. IPA diagram of cooperative services from the perspective of farmer

The assessment of services by small-scale dairy farmers shows that services in quadrant I are aspects of services that are considered important by cooperative member farmers but in reality these services are not in line with expectations, such as the provision of feed inputs and the collection and marketing of milk. These service aspects need to be improved again in order to satisfy cooperative member farmers (Figure 8).

The assessment of services by large-scale dairy farmers, it shows that services in quadrant I, such as education and training services for cooperative member farmers, need to be improved. In quadrant II there are aspects of services that are considered important and have good service performance such as collection and marketing of cow's milk, treatment and prevention of disease, artificial insemination services, technical counseling, and pregnancy screening.

Based on the IPA results, it can be concluded that the services provided by the cooperative to members are quite in accordance with member expectations. Services that are considered important by members achieve high performance and services that are relatively less important achieve lower performance. But on the other hand, services that are considered important but poor service performance need to be evaluated and improved again.

The results of the IPA, it can be concluded that the services provided by the cooperative to members are sufficient in accordance with member expectations. However, services that are considered important but whose service performance is less than good need to be evaluated and improved again. Furthermore, a chi-square test analysis was carried out to test the significant relationship between satisfaction with cooperative services and livestock business performance can be seen in Table 4.

Table 4. Chi-Square Analysis

Cooperative Performance Assessment	X^2
Storage and Marketing of Dairy Cow Milk	4.27**
Feed Provision	4.38**
Artificial Insemination Services	3.74*
Disease Treatment and Prevention Services	4.20**
Pregnancy Examination Services	3.73*
Technical Counseling	3.77*
Education and Training for Members	3.84*
Consultation	5.20**
Capital	5.20**

Furthermore, the chi-square test results confirmed a statistically significant association between the cooperative's service performance and the business performance of its members. Specifically, services such as cow milk storage and marketing, feed provision, disease treatment and prevention, consultation, and capital provision were found to have a strong and significant impact on the profitability of dairy farms. This finding aligns with the broader literature on cooperatives, which emphasizes their role in providing essential resources and services that can enhance the economic viability of small-scale farmers (Priyono & Priyanti, 2015).

Interestingly, the analysis also revealed that services like artificial insemination, pregnancy screening, technical counseling, and education and training, while still considered important by members, had a more moderate impact on farm profitability. This suggests that while these services are valued, their direct contribution to economic outcomes may be less pronounced compared to the core services mentioned

earlier. This finding highlights the need for cooperatives to carefully balance their resource allocation and prioritize services that have the most significant impact on the economic well-being of their members. In particular, the findings of Malau et al. (2021) emphasize that education and training are very important as they relate to efficiency and the improvement of milk production.

Overall, this study underscores the critical role that cooperatives play in supporting the dairy farming sector in Cianjur. The findings emphasize the importance of effective service delivery, particularly in areas like milk marketing, feed provision, and animal health, in enhancing the profitability and sustainability of dairy farms. The study also highlights the need for further research to explore the nuanced relationship between different cooperative services and the diverse needs of dairy farmers, with the ultimate goal of optimizing cooperative strategies to maximize the benefits for both individual farmers and the broader agricultural community.

Conclusion

The study also highlights disparities between small-scale and large-scale farmers within the cooperative. Small-scale farmers, who constitute the majority of the membership, predominantly have primary school education, limiting their capacity to adopt innovative farming practices. In contrast, large-scale farmers tend to have higher education levels, potentially facilitating their access to and utilization of new technologies and management strategies. This educational gap may contribute to the observed differences in farm performance, with large-scale farmers generally achieving higher milk production and profitability compared to their small-scale counterparts.

The outbreak of Foot and Mouth Disease (FMD) in 2022 significantly impacted the cooperative's performance, leading to a sharp decline in milk production and profitability. This underscores the vulnerability of the dairy sector to external shocks and the need for robust risk management strategies. Additionally, the high cost of feed, particularly concentrates and supplements, poses a persistent challenge for farmers, further impacting their economic viability. Despite these challenges, the cooperative plays a crucial role in supporting its members by providing a comprehensive range of services. These services, including milk collection and marketing, feed provision, artificial insemination, veterinary care, and financial assistance, are highly valued by farmers and contribute to their overall well-being. However, the study also identifies areas where the cooperative could enhance its service delivery, particularly in education and training programs, which are essential for empowering farmers and promoting sustainable practices.

The suggestions that can be put forward are: To enhance the financial sustainability and resilience of the MPC North Cianjur, a multi-pronged approach is recommended. The cooperative should prioritize enhancing operational efficiency, exploring cost reduction strategies, and diversifying its income streams. According to Sultana et al (2020), assured secured market for farmers' production at a fair price and provides technical assistance through training and extension services that lead the higher production and higher income for the farmers. Investing in modern technologies, such as improved milk processing equipment, can streamline operations and reduce labor costs. Additionally, optimizing resource allocation, such as feed management and herd health practices, can minimize production costs and improve milk quality. Exploring alternative revenue streams, such as developing value-added dairy products or agritourism initiatives, can further bolster the cooperative's financial performance. Addressing the high cost of feed through collective bargaining with suppliers or promoting local fodder cultivation can alleviate financial pressure on farmers and enhance the cooperative's overall economic resilience.

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Author Contributions

D.T.: Coordinating writing and editing the manuscript; A.A.: conceptualization of ideas, data processing, writing, and editing the manuscript; Y.L.P: Collecting data, data processing, and writing the manuscript.

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Conflict of Interest

In writing this article, the authors do not have any conflict of interest.

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