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SUSTAINABILITY ANALYSIS OF MILKFISH FARMING IN TRADITIONAL PONDS IN BLANDONGAN VILLAGE, BUGUL KIDUL SUB-DISTRICT, PASURUAN CITY

ANALISIS KEBERLANJUTAN USAHA BUDI DAYA BANDENG DI TAMBAK TRADISIONAL KELURAHAN BLANDONGAN, KECAMATAN BUGUL KIDUL KOTA PASURUAN

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ABSTRACT

Pasuruan City, located in East Java, plays a significant role in the fisheries sector, contributing to industrial and trade activities. However, production declines, influenced by poor water quality and flooding, threatens the sustainability of *jelak* milkfish farming. This study aims to analyze the status and sustainability index of the milkfish farming business using the MDS-Raps method, which evaluates it based on five dimensions: ecology, economy, social aspects, technology, and institutions. The respondents included 41 farmers from four fish farming groups (Pokdakan). The results shows that the business is fairly sustainable, with a multidimensional index of 51.99, meaning it can be continued and developed but does still has room for improvements. The sustainability status by dimension is as follows: ecological (65.24, fairly sustainable), economic (37.39, less sustainable), social (78.72, very sustainable), technological (27.40, less sustainable), and institutional (51.18, fairly sustainable). The study also proposes seven strategies to enhance sustainability and identifies a link between the MDS analysis and SWOT strategies in managing milkfish farming. Each SWOT strategy offers insights for improving the value of individual dimensions in the MDS framework.

Keywords: milkfish, sustainability, Pasuruan City, fishpond business.

ABSTRAK

Kota Pasuruan, yang terletak di Jawa Timur, memainkan peran penting dalam sektor perikanan dan berkontribusi pada aktivitas industri dan perdagangan. Namun, penurunan produksi akibat penurunan kualitas air dan banjir mengancam keberlanjutan usaha tambak bandeng *jelak*. Penelitian ini bertujuan untuk menganalisis status dan indeks keberlanjutan usaha tambak bandeng dengan menggunakan metode MDS-Raps, yang mengevaluasi lima dimensi: ekologi, ekonomi, sosial, teknologi, dan kelembagaan. Responden dalam penelitian ini terdiri dari 41 petambak dari empat kelompok budidaya ikan (Pokdakan). Hasil penelitian menunjukkan bahwa usaha ini tergolong cukup berkelanjutan, dengan indeks multidimensional sebesar 51,99, yang berarti dapat dilanjutkan dan dikembangkan meskipun masih memerlukan perbaikan. Status keberlanjutan per dimensi adalah sebagai berikut: ekologi (65,24, cukup berkelanjutan), ekonomi (37,39, kurang berkelanjutan), sosial (78,72, sangat berkelanjutan), teknologi (27,40, kurang berkelanjutan), dan kelembagaan (51,18, cukup berkelanjutan). Penelitian ini juga mengajukan tujuh strategi untuk meningkatkan keberlanjutan dan mengidentifikasi hubungan antara analisis MDS dan strategi SWOT dalam pengelolaan usaha tambak bandeng. Setiap strategi SWOT memberikan wawasan untuk meningkatkan nilai dimensi individual dalam kerangka MDS.

Kata kunci: ikan bandeng, keberlanjutan, Kota Pasuruan, usaha tambak.

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INTRODUCTION

Pasuruan City is located along the main transportation and trade route between Surabaya and Bali. With a coastal area of 36.58 square kilometers, it plays a significant role in contributing to the industrial and trade sectors (Subagio *et al*., 2020). One of the primary aquaculture commodities in Pasuruan City is milkfish, accounting for 49% of the city's total aquaculture production. Other aquaculture commodities include catfish at 33%, seaweed at 13%, and tilapia at 5%. To boost the economy in the industrial and trade sectors, the local government of Pasuruan City has designated *jelak* milkfish as one of its culinary and tourism icons. Every year, since 2020, the Pasuruan City Fisheries Department has organized the "Jelak Milkfish Festival," which has been held annually without interruption. Additionally, the Pasuruan City Government, through its relevant departments, developed a pre-design for a "Jelak Milkfish Village" located in Blandongan Village in 2022. This initiative aligns with the Ministry of Fisheries and Marine Affairs' 2022 development priorities, which focus on building aquaculture villages based on local wisdom. The goal is to alleviate poverty by increasing the income of fish farmers and communities while preserving economically valuable commodities at risk of extinction (Arifin, 2021; Pusat Pelatihan dan Penyuluhan Kelautan dan Perikanan, 2021).

The term *jelak* milkfish is derived from the name Jelakrejo Hamlet, located in Blandongan Village, Bugul Kidul Sub-District, Pasuruan City. According to the Regional Spatial Plan (RTRW) of Pasuruan City 2021–2041, stipulated by Regional Regulation No. 1 of 2022, the aquaculture area in Blandongan Village is designated as a fish farming zone, covering 143 hectares. Data on milkfish aquaculture production in Pasuruan City shows a peak in 2020 of 1,725 tons, followed by a downward trend in production in 2021 of 263 tons, in 2022 of 375 tons.

The declining production of milkfish in 2021–2022 in Pasuruan City is attributed to deteriorating water quality and ROB flooding. According to Izzah (2022), tidal flooding (ROB) leads to reduced production, increased pests, physical damage to ponds, higher production costs, and the loss of part of the farmers' land. The two-year declining trend in production and the loss of 214 hectares of aquaculture land pose a serious threat to the sustainability of *jelak* milkfish farming in Pasuruan City.

Sustainability is a crucial concept in fisheries development, aiming to improve both resource conditions and the welfare of fishing communities (Nirgasari, 2015). Fisheries development focuses on three main pillars: economic, social, and ecological sustainability (Purwaningsih & Santosa, 2015). Sustainable practices can enhance farmers' well-being, providing consistent income and reducing poverty, while also minimizing conflicts among fish farmers (Amura & Pirhel, 2021). Dzikrillah *et al*. (2017), emphasized that sustainable development seeks a balance between economic growth (economic dimension), environmental preservation (ecological dimension), equity (social dimension), technology development, and institutional effectiveness. Effective implementation of sustainable development requires strong commitment from key stakeholders in order to achieve the desired outcomes.

The Multidimensional Scaling-Rapid Appraisal for Sustainability (MDS-Raps) method, adapted from the Rapid Appraisal for Fisheries (Rapfish) technique, allows a comprehensive analysis of various aspects, including environmental, economic, and social factors, in regards to evaluating sustainability. This method provides a more detailed and accurate depiction of the sustainability status of aquaculture operations Kifaf *et al*. (2023). MDS-Raps also incorporates leverage analysis to identify the most sensitive attributes affecting sustainability, enabling the development of effective strategies to improve sustainability (Agustin & Hasan, 2021). Therefore, MDS-Raps is a suitable method for analyzing the management strategies needed to ensure the sustainability of *jelak* milkfish farming in Pasuruan City.

RESEARCH METHODS

Blandongan Village located in the Bugul Kidul Sub-District of Pasuruan City, East Java Province. It borders the sea, offering abundant marine resources, including both capture and aquaculture fisheries. The brackish ponds in Blandongan Village are used for farming milkfish, seaweed, and shrimp. Proper pond management can provide a significant source of income for the community. Several factors support traditional milkfish farming in these ponds, these factors includes road access, extension services, irrigation, financing institutions, and hatcheries that produce high-quality seeds (Erwindo *et al*., 2022). Farmers in Blandongan manage their ponds traditionally, with an average pond area of 1 to 1.5 hectares. Some embankments are planted with mangroves to strengthen the structures and also to provide shading for the general area.

This research finds the quantitative descriptive approach the most suitable approach in explaining and analysing the datasets and facts from the field. This also includes the factual information collected from the research location and expert opinions, with the main goal to assess the sustainability of milkfish pond farming in Pasuruan City. The sustainability analysis of the milkfish farming business in Pasuruan City is carried out using the Rapid Appraisal (RAP) simulation with the Multidimensional Scaling (MDS) technique and SWOT analysis. Several factors can either promote or hinder the development of milkfish pond farming in Pasuruan, depending on whether they benefit fish farmers as key stakeholders or not. The results of the sustainability analysis are presented as indices and sustainability statuses for each dimension and for the combination of all five dimensions. These sustainability analysis results serve as a reference for formulating strategic policies for managing the milkfish pond business in Pasuruan City.

This sustainability research focuses on local fish farming groups, including Pokdakan Aman, Pokdakan Banyu Urip, Pokdakan Jelak Jaya Makmur, and Pokdakan Tambak Makmur. All members of these groups, a total of 41 farmers, were included as respondents. All respondents are male, as all farming activities, from pre-production to post-harvest, are managed by men. Additionally, 14 expert respondents were selected, including governments, community groups and environmental activists. Data collection methods included field observations, questionnaire distribution, and direct interviews with respondents.

The sustainability analysis of the milkfish farming business was conducted using the Multidimensional Scaling (MDS) approach with the support of Rapfish software (Rapid Appraisal for Fisheries). The sustainability of the milkfish farming business was evaluated across five dimensions: ecological, economic, social, institutional, and technological. According to Agustin & Hasan (2021), the data were analyzed using the Rapfish method, which was developed by the University of British Columbia, Canada, to evaluate the sustainability of fisheries through a multidisciplinary approach. The results of the sustainability assessment are expressed in the form of sustainability indices, which reflect the sustainability status of milkfish pond management activities. These indices are based on the conditions observed during the year preceding the survey used for the sustainability analysis.

SWOT analysis is used to identify the various strengths, weaknesses, threats, and opportunities that exist in milkfish farming in Pasuruan City. According to Fatimah (2016), SWOT analysis is a classic strategic planning method that provides a simple way to estimate the best way to determine a strategy. This analytical approach is based on logic that can maximize strengths and opportunities while minimizing weaknesses and threats.

RESULT AND DISCUSSIONS

According to data from the Pasuruan City Fisheries Department, there are four registered fish farming groups (Pokdakan) in Blandongan Village. On average, the stocking density for milkfish is 3,000 fish per hectare. Most farmers rely on natural feed, though a small number use supplementary feeds such as pellets or noodles as an alternative. Interviews revealed that milkfish farming follows a 4–6month production cycle per season, with an average yield of 200 kg per hectare per season. However, the primary pond roads are only accessible by motorcycles, and during the rainy season, it would be even more difficult to traverse due to poor road conditions.

Most respondents (90%) have over ten years of farming experience, indicating that the farmers in Blandongan Village are experienced in milkfish aquaculture. Education can also influence a person's mindset (Gusti *et al*., 2022). Most respondent own ponds larger than one hectare, while only 26% own ponds smaller than one hectare. About 68% of the respondents own their ponds outright. The study classifies pond farming activities into primary and secondary occupations. The data shows that 63% of the respondents treat milkfish farming as a secondary income source, meaning that most farmers have other primary occupations. This situation occurs because traditional milkfish farming does not require constant presence at the pond, allowing farmers to engage in other activities. Some farmers also employ non-family labor to manage their ponds. Most farmers act as both landowners and decision-makers.

In this study, the sustainability status of *jelak* milkfish farming in Pasuruan City is evaluated across five sustainable development dimensions: ecological (10 attributes), economic (12 attributes), social (8 attributes), institutional (7 attributes), and technological (11 attributes). Using the MDS approach with Rapfish software, the analysis shows that the overall sustainability status

is fairly sustainable, with an index value of 51.99. This score is derived from the average results of the five dimensions, as illustrated in the radar chart (Figure 3).

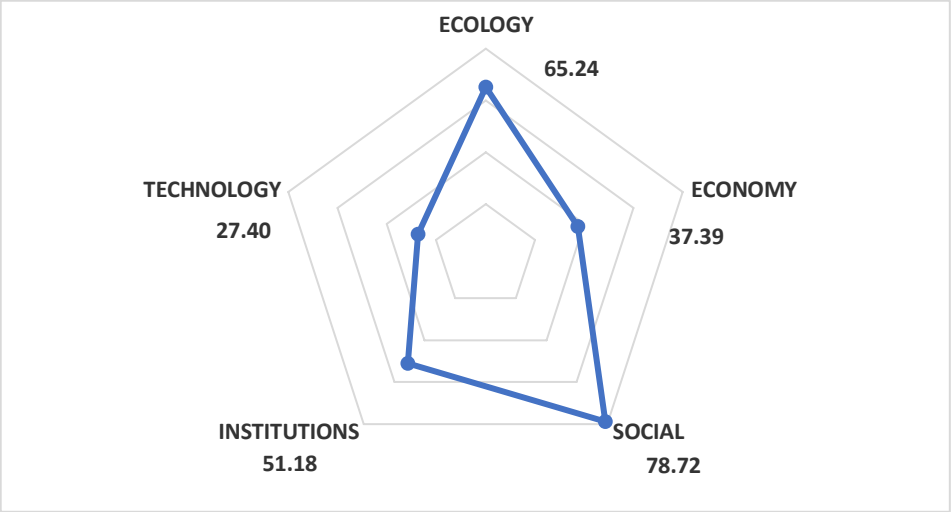

Figure 3. Sustainability Index and Status of *Jelak* Milkfish Pond Management in Pasuruan City

It can be seen that all dimensions demonstrate a level of sustainability, with the sustainability index values for each dimension as follows: the ecological dimension falls under the fairly sustainable category with an index value of 65.24, the economic dimension is categorized as less sustainable with an index value of 37.39, the social dimension is considered very sustainable with an index value of 78.72, the technological dimension is categorized as less sustainable with an index value of 27.40, and the institutional dimension falls under the fairly sustainable category with an index value of 51.18.

The multidimensional sustainability analysis shows that the status of the milkfish farming business in Pasuruan City is fairly sustainable. This means that, from the perspectives of ecology, economy, social aspects, institutions, and technology, the milkfish farming business is viable and can continue to be developed. Based on the analysis, the social dimension has the highest sustainability index. However, simultaneously, the other four dimensions require further development and improvements in the evaluated attributes. The error level in the MDS analysis can be assessed by comparing the difference between the Rapfish values and the Monte Carlo simulation results. The Monte Carlo analysis, conducted at a 95% confidence interval, indicates that the difference between the Monte Carlo and MDS results is less than 5%. This suggests that the error rate in each attribute is relatively small, whether due to variations in respondents' assessments, data entry errors, or missing data. The MDS and Monte Carlo index values are presented in Table 1.

The sustainability index for each dimension can be improved by focusing on individual attributes and making targeted improvements. Enhancing one attribute in a particular dimension will have a consequential impact on other dimensions. The concept of sustainable development does not require all index values across dimensions to be equal. Instead, certain dimensions should be prioritized depending on the conditions of the region. The MDS method, with the

dimensions and attributes used in this study, can be replicated for other research by modifying the attributes to match local conditions, as an attribute that is relevant in one area may not be applicable in another (Fitra, 2019).

Table 1. MDS and Monte Carlo Analysis Results at a 95% Confidence Interval

Dimension	Sustainability Index Value (%)		Difference Between MDS and Monte Carlo
	Rapfish	Monte Carlo	
Ecology	65.24	65.24	0.00
Economy	37.39	37.40	0.01
Social	78.72	78.72	0.00
Institutional	51.18	51.19	0.01
Technology	27.40	27.41	0.01

Sustainability Index of the Ecological Dimension

The MDS analysis shows that the ecological dimension is categorized as fairly sustainable, with a sustainability index value of 65.24. This index is influenced by 10 attributes, which serve as the basis for the sustainability assessment (Figure 2). The sustainability attributes in the ecological dimension include the intensity of pest and disease outbreaks (L1), the use of fertilizers, medicines, and pesticides (L2), the occurrence of ROB flooding or river overflow (L3), the water source for the ponds (L4), the availability of water for the ponds (L5), the distance of the pond from the estuary (L6), the source of milkfish seeds (L7), the size of the stocked fish seeds (L8), the fish density in the pond (L9), and the condition of mangroves around the pond (L10). A leverage analysis was conducted to identify which attributes have the most significant impact on the ecological dimension's sustainability index. Mahida (2020) states that the sensitive attributes in leverage analysis are those with the highest root mean square (RMS) values. The results of the leverage analysis for the ecological dimension (Figure 4) reveal that two out of the ten attributes analyzed are particularly sensitive to the sustainability of milkfish farming. These are the distance of the pond from the estuary (L6) with an RMS value of 6.08, and the availability of water for the ponds (L5) with an RMS value of 5.97.

Based on Figure 4, the attributes of pond distance from the estuary (L6) and water availability (L5) shows the most prominent RMS values among the ecological dimension attributes. This is due to water availability issues, which are directly influenced by the rivers and water channels in the pond areas of Blandongan Village that are inadequate. The rivers used to irrigate ponds located far from the estuary are intermittent rivers, which only carry water during the rainy season. Additionally, some water channels are merely elongated excavations that would only be filled with water during high tides. The amount of water stored in these channels is also limited, requiring further improvements to enhance water access for the farmers.

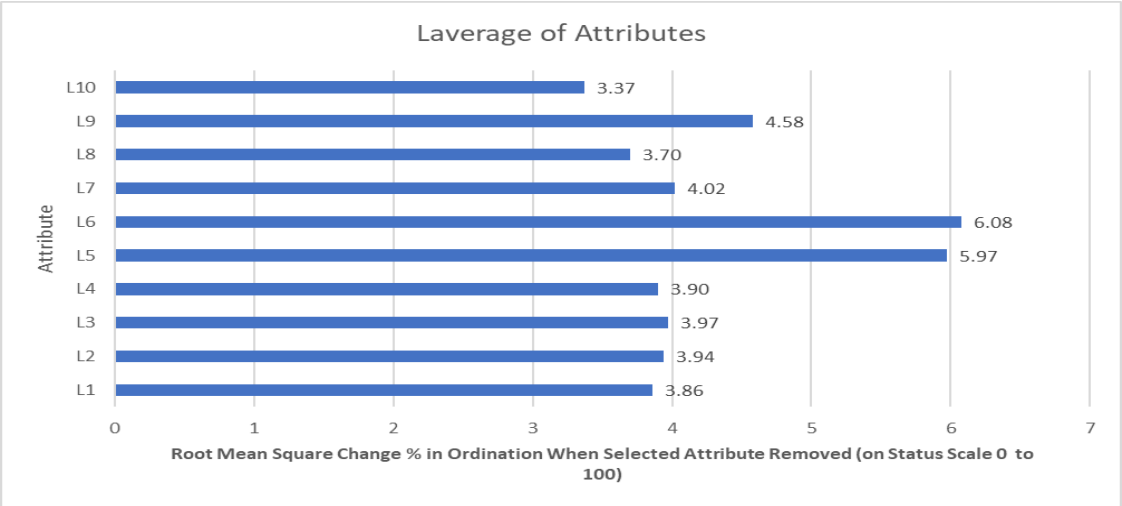

Figure 4. Sensitive Attributes in the Ecological Dimension

According to Agustin & Hasan (2021), water is a crucial resource in the cultivation of milkfish. The distance of the pond from the estuary is also a highly sensitive attribute within the ecological dimension. These two attributes are interconnected, as both relate to water availability. The farther the pond is from the estuary, the greater the effort required to provide sufficient water for milkfish farming activities. Therefore, additional attention and support are needed for ponds located far from the estuary, where access to water is more challenging. In traditional milkfish farming in Pasuruan City, there have been almost no reports of disease outbreaks, although pest attacks do still occur. Milkfish are relatively resistant to diseases, as they are active swimmers (Arifin, 2023). Regarding the use of fertilizers, pesticides, and medicines, farmers in Blandongan, adhere to the recommended doses listed on the packaging. However, they encounter difficulties in obtaining fertilizers, which hinders optimal production outcomes.

The attribute of pond distance from the estuary is closely related to the availability of water for the ponds. This attribute is essential to address and improve, as it has a significant impact on the sustainability of pond farming in Pasuruan City. Therefore, to enhance the ecological dimension's sustainability, efforts must be made to improve access to water, particularly for ponds located far from the estuary.

Sustainability Index of the Economic Dimension

The MDS analysis shows that the economic dimension is categorized as less sustainable, with a sustainability index value of 37.39. This index is influenced by 12 attributes that serve as the basis for the sustainability assessment (Figure 5). The sustainability attributes in the economic dimension include pond farming feasibility (E1), farmer income (E2), the number of workers involved in pond production activities (E3), market access for pond products (E4), the target market for *jelak* milkfish (E5), the intensity of capital loans (E6), pond management status (E7), alternative employment (E8), support or subsidies from the government or private sector (E9), market demand for milkfish (E10), sources of business capital (E11), and milkfish price trends (E12). The sensitive attributes affecting the sustainability of *jelak* milkfish pond management in Pasuruan City are identified through leverage analysis. The key leverage factors are the attributes with the highest

root mean square (RMS) values (Mahida, 2020). The leverage analysis results for the economic dimension (Figure 5) indicate that two out of the 12 attributes analyzed are particularly sensitive to the sustainability of pond management. These sensitive attributes, in order of importance, are pond management status (E7) with an RMS value of 16.09, and milkfish price trends (E12) with an RMS value of 15.69.

Based on Figure 5, the attributes of milkfish price trends (E12) and pond management status (E7) shows the most prominent RMS values among the economic dimension attributes. Most of the ponds in the study area are self-managed and privately owned, making this aspect essential to maintain and improve. Enhancing pond management involves stabilizing and increasing the value-added of milkfish, which can motivate pond owners and managers to be more committed to milkfish farming.

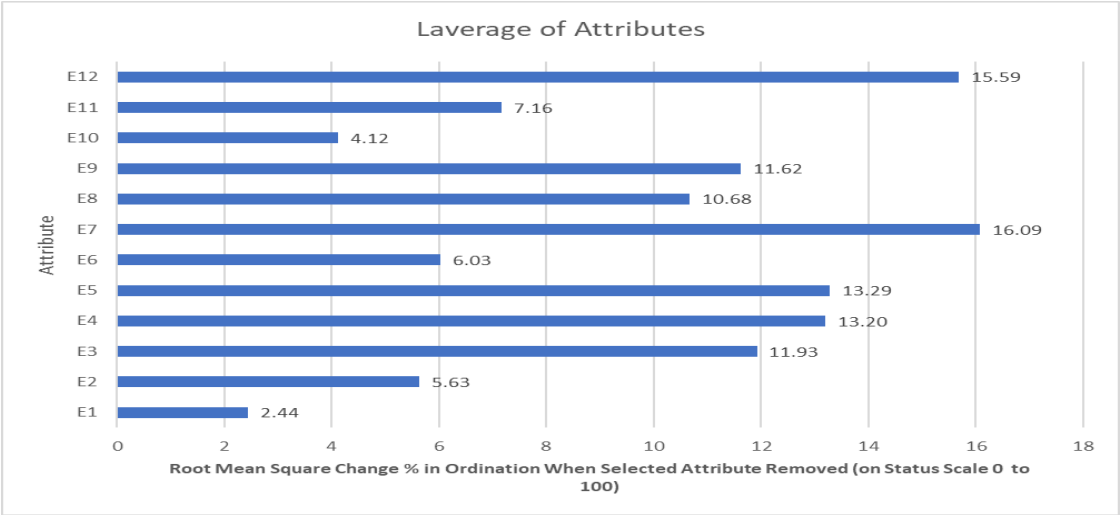

Figure 5. Sensitive Attributes in the Economic Dimension

According to Febriana (2023), an increase in the number of farmers or fish farmers who own their land (rather than working as laborers or sharing profits) will accelerate the economic improvement of farmers. Conversely, if farmers only act as laborers or rely on profit-sharing systems, their income and economic well-being will decrease, negatively impacting the sustainability of the economic dimension. The price of milkfish tends to be relatively stable compared to other fish species, with prices in the Blandongan pond area ranging between IDR 10,000 and 20,000 per kilogram, depending on the size of the fish. Sensitive attributes have a significant influence on changes in the sustainability of the dimension in which they are used, meaning that changes in these attributes can quickly either enhance or diminish the sustainability of the economic dimension. The attributes of pond management status and milkfish price trends are essential to monitor and improve, as they have a substantial impact on the sustainability of pond farming in Pasuruan City. Therefore, to enhance the sustainability of the economic dimension, it is necessary to improve pond management by farmers and maintain stable milkfish prices.

Sustainability Index of the Social Dimension

The MDS analysis shows that the social dimension is categorized as very sustainable, with a sustainability index value of 78.72. This index is influenced by eight attributes, which serve as the

basis for the sustainability assessment (Figure 4). The sustainability attributes in the social dimension include (S1) education, (S2) motivation, (S3) the length of time engaged in pond farming, (S4) family participation in pond activities, (S5) conflict intensity, (S6) the frequency of meetings among farmers, (S7) the desire to leave the pond farming business, and (S8) road access to the pond location. A leverage analysis was conducted to identify which attributes have the most significant influence on the sustainability index of the social dimension.

The attribute selected as the key leverage factor is the one with the highest root mean square (RMS) value. Changes in RMS values are derived from the final analysis results, and the larger the change in the RMS value, the more sensitive the attribute is in influencing the improvement of sustainability status. The leverage analysis results for the social dimension (Figure 6) indicate that, among the eight attributes analyzed, one attribute stands out as the most sensitive in influencing the sustainability of *jelak* milkfish pond management in Pasuruan City: (S7) the desire to leave the pond farming business, with an RMS value of 20.96. Sensitive attributes significantly impact changes in the sustainability of the dimension they belong to, meaning that adjustments to these attributes can quickly either enhance or diminish the dimension's sustainability.

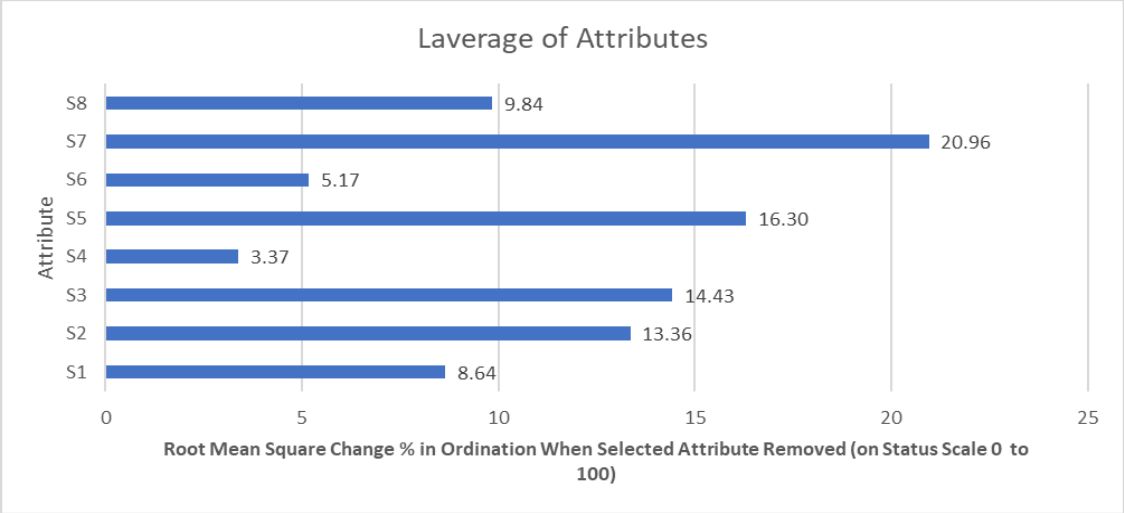

Figure 6. Sensitive Attributes in the Social Dimension

Based on Figure 6, the attribute of the desire to leave the pond farming business (S7) shows the most prominent RMS value among the social dimension attributes. Most respondents expressed a desire to leave the pond farming business in Blandongan Village; however, this has not yet materialized, as milkfish farming remains to be their primary source of income. The desire to leave the pond farming business is an important attribute to monitor and improve, as it has a significant impact on the sustainability of pond farming in Pasuruan City. Therefore, to enhance the sustainability of the social dimension, the government must take part in increasing the interest of farmers, it can be through government programs in the form of pond revitalization, such as normalization of waterways, strengthening mangrove planting as an effort to improve water quality, creating new water sources to meet water availability, periodic monitoring of seeds and others.

Sustainability Index of the Technological Dimension

The sustainability index value for the technological dimension is 27.40, indicating a less sustainable status. The sustainability status of this dimension is influenced by 11 attributes, which serve as the basis for the sustainability assessment (Figure 7). The sustainability attributes in the technological dimension include (T1) the application of aquaculture technology, (T2) the use of post-harvest technology, (T3) the implementation of pest and fish disease control technology, (T4) the farming system, (T5) the duration of the farming cycle, (T6) harvest decisions, (T7) the frequency of water quality monitoring, (T8) the completeness of pond facilities, (T9) the frequency of fish health monitoring, (T10) the frequency of fish growth monitoring, and (T11) the size of the pond area. The key leverage factors are the attributes with the highest root mean square (RMS) values.

The leverage analysis results for the technological dimension (Figure 7) indicate that, among the 11 attributes analyzed, one attribute stands out as the most sensitive in influencing the sustainability of *jelak* milkfish pond management in Pasuruan City: (T6) harvest decisions, with an RMS value of 7.34. The attribute selected as the key leverage factor is the one with the highest root mean square (RMS) value. The leverage analysis results for the technological dimension (Figure 5.13) confirm that (T6) harvest decisions, with an RMS value of 7.34, is the most sensitive attribute affecting the sustainability of milkfish pond management in Pasuruan City.

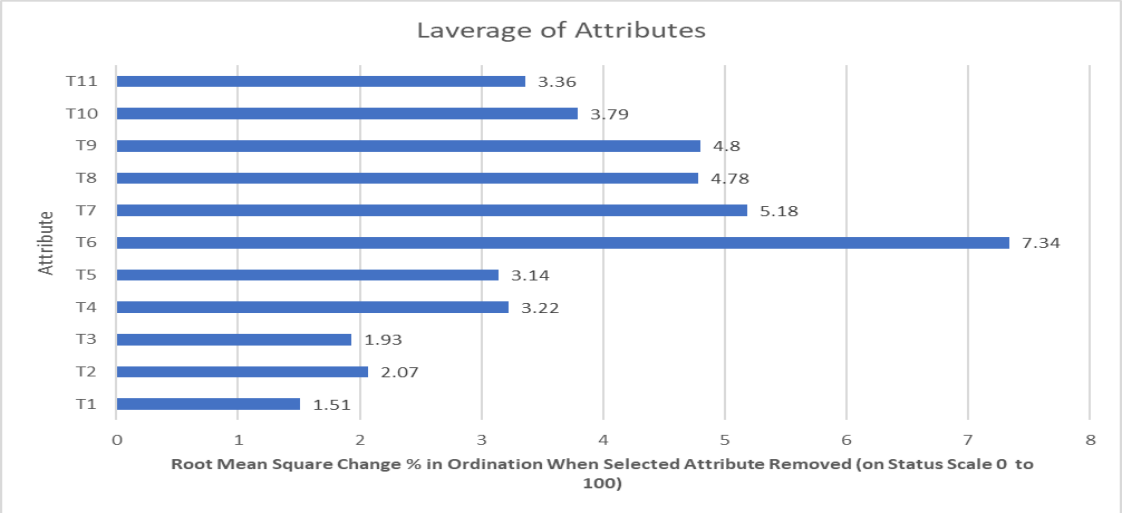

Figure 7. Sensitive Attributes in the Technological Dimension

Based on Figure 7, the attribute of harvest decisions (T6) shows the most prominent RMS value among the technological dimension attributes. In most cases, harvest decisions at the ponds in Blandongan, Pasuruan City, follow the farmers' plans or harvest schedules. This is because the farmers already have buyers lined up to purchase their harvest, and the milkfish have reached the ideal target size when being harvested. However, these farmers have not yet adopted practices like those farmers in Sumbawa Island. In addition to that, these farmers does not conduct a routine monitor of the water quality and the health of their milkfish. This lack of monitoring is believed to contribute to the lower sustainability value in the technological dimension. Harvest decisions are an

important attribute that require careful attention and improved planning quality, as they have a significant impact on the sustainability of pond farming in Pasuruan City. Therefore, to enhance the sustainability of the technological dimension, it is necessary to increase the farmers' knowledge of good aquaculture practices (CBIB) so that their harvest decisions align well with their planning.

Sustainability Index of the Institutional Dimension

The MDS analysis shows that the institutional dimension is categorized as fairly sustainable, with a sustainability index value of 51.18. This index is influenced by seven attributes, which serve as the basis for the sustainability assessment (Figure 8). The sustainability attributes in the institutional dimension include (K1) the role of fisheries extension officers in fostering pond farming activities, (K2) the role of the government in supporting pond farming, (K3) the role of fish farming groups in developing the pond business, (K4) the presence of suppliers for aquaculture production facilities, (K5) the frequency of extension services and training for farmers, (K6) the availability of formal and informal regulations for pond management, and (K7) the role of community leaders in fisheries management. The leverage analysis results for the institutional dimension (Figure 8) indicate that, among the seven attributes analyzed, one attribute stands out as the most sensitive in influencing the sustainability of *jelak* milkfish pond management in Pasuruan City. The most sensitive attribute in the institutional dimension is (K5) the frequency of extension services and training for farmers, with an RMS value of 5.96.

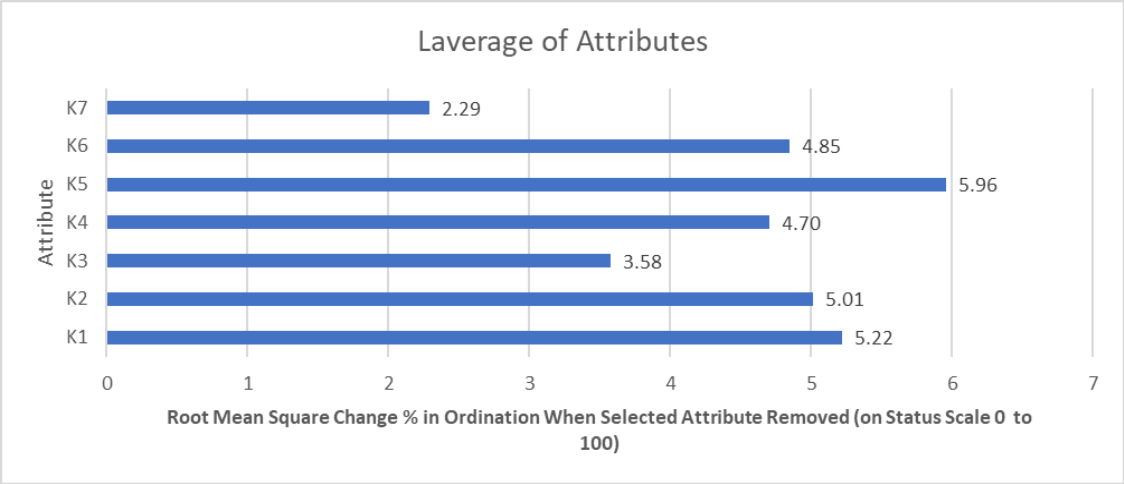

Figure 8. Sensitive Attributes in the Institutional Dimension

Based on Figure 8, the attribute of the frequency of extension services and training for farmers (K5) shows the most prominent RMS value among the institutional dimension attributes. Fisheries extension officers play a vital role in improving human resources. Through mentoring activities and field lectures, extension officers continuously oversee government programs to ensure they effectively reach aquaculture entrepreneurs, particularly pond farmers.

Leverage attributes are communicated weekly, but not comprehensively to all farmers. Comprehensive meetings are only held when government assistance is expected. As added by Kifaf (2022), in practice, extension services and training are conducted more than once every three months, and sometimes even once a month. Extension officers play a crucial role in the

aquaculture process. The frequency of extension services and training is an important attribute to monitor and improve, as it has a significant impact on the sustainability of pond farming in Pasuruan City. Therefore, to enhance the sustainability of the institutional dimension, the frequency of both formal and informal extension services and training for farmers needs to be increased.

The Relationship between SWOT Analysis Results and the Sustainability Analysis of Milkfish Pond Farming in Pasuruan City

Table 2. The Relationship between SWOT Analysis Results and the Sustainability Analysis of Milkfish Pond Farming in Pasuruan City

No.	SWOT Analysis Results	Sustainability Analysis Results
1.	Ensuring that the production process runs efficiently and according to standards.	Technological Dimension • Harvest Decisions
2.	Collaborating with relevant agencies and the government to promote good aquaculture practices.	Institutional Dimension • Frequency of extension services and training for farmers
3.	Improving the quality and quantity of infrastructure to better support milkfish farming.	Ecological Dimension • Pond distance from the estuary • Water availability
4.	Evaluating the production area according to the demand for milkfish by ensuring active pond production and transitioning to semi-intensive farming systems.	Economic Dimension • Pond management status • Milkfish price trends Technological Dimension • Harvest decisions
5.	Evaluating and monitoring milkfish farm management to ensure maximum and high-quality production.	Social Dimension • The desire to leave the pond farming business
6.	Conducting planned promotions of milkfish products to increase consumer's interest.	Economic Dimension • Milkfish price trends
7.	Increasing product diversification through well-planned research.	Institutional Dimension • Frequency of extension services and training for farmers

The SWOT analysis (strength-weakness-opportunity-threat) in this study was used to address the fourth issue, which involves formulating a strategic management model for milkfish pond farming in Pasuruan City. Milkfish pond farming has been practiced by the community for a long time. However, the local government has not yet developed a strategy for its advancement. The formulation of the strategy involves identifying the internal and external factors of the milkfish farming business in Pasuruan City.

CONCLUSION AND SUGGESTION

Conclusion

Based on the research findings and discussion on the sustainability analysis of *jelak* milkfish pond farming in Pasuruan City, it can be concluded that the multidimensional sustainability status of the business is fairly sustainable. Specifically, the ecological dimension is fairly sustainable, the economic dimension is less sustainable, the social dimension is very sustainable, the technological dimension is less sustainable, and the institutional dimension is fairly sustainable. There are seven strategic alternatives for managing *jelak* milkfish pond farming in Pasuruan City. First, by ensuring

that the production process runs efficiently and according to standards. Second, collaborating with relevant agencies and the government to promote good aquaculture practices. Third, improving the quality and quantity of the infrastructures used to better support milkfish farming. Fourth, evaluation of the production area based on the demand for milkfish. Fifth, conducting a routine monitor and assessment in regards to the farm management would ensure the maximum and high-quality levels of production. Sixth, lanned promotions of milkfish products are needed to increase consumer interest and seventh, along with efforts to diversify products through well-planned research.

Suggestion

Based on the discussion and conclusions that have been described previously, the suggestions that researchers can give are the need to control and prevent eutrophication in milkfish ponds in Pasuruan City, it is crucial to improve the human resources (HR) of farmers through counseling and training to increase the value of sustainability in the economic and technological dimensions and the need for increased collaboration between the executive, judiciary, legislature and the private sector in the management of pond businesses in Pasuruan City.

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