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SUSTAINABILITY STATUS OF POND AQUACULTURE IN TAMBAKBULUSAN VILLAGE ON SOCIAL OR CULTURAL DIMENSION AND LEGAL OR INSTITUTIONAL DIMENSION

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Abstract : Sustainability in the management of aquaculture activities is very important because it will make the welfare of the stakeholders. The research objectives initiated in the context of this discussion include several things, 1) Analyzing the status or index of sustainability that extends to other dimensions including social or cultural, and legal in relation to aquaculture ponds in Bulusan Pond Village Karangtengah District Demak Regency, 2) Knowing what are the sensitive attributes (levers) that affect the sustainability of aquaculture in Tambakbulusan village. The benefits of research is expected to provide benefits to the provision of comprehensive information, especially for stakeholders will describe the status of the sustainability of aquaculture ponds Bulusan Pondvillage. The implementation time of the research is detailed in March to April 2023 with the chosen setting is Tambakbulusan Village, Karangtengah District, Demak Regency. The determination of methods related to data analysis is with quantitative methods assisted by qualitative data results. The data obtained came from primary and secondary data. Primary data were collected from direct observations and interviews in the field with 47 (forty-seven) respondents. The analysis used is Multidimensional Scalling Rapid Appraisal for

Fisheries (MDS-RAPFISH) to analyze several aspects or dimensions of sustainability. The results of the sustainability analysis obtained are in the social or cultural dimension of 61.441 including also quite sustainable and in the legal or institutional dimension of 42.909 including less sustainable. Sensitive attributes in the social or cultural dimension are the attributes of participation in development forums, labor absorption, and family participation in aquaculture, and in the legal or institutional dimension, sensitive attributes are known to include the attributes of the intensity of law violations in relation to aquaculture, the existence of financial institutions, the availability of cultivator groups, and the existence of customary or religious law instruments.

Keywords: *MDS-RAPFISH,* Bulusan Pond*Village, Pond*

INTRODUCTION

Java Island contains various provinces, one of which is Central Java which as the name implies is in the middle between West Java and East Java Provinces. When observed from an astronomical position, Central Java is located at coordinates 5040' – 8030' South Latitude (LS) and 108030' – 111030' East Longitude (BT) which includes Karimunjawa Island. The administrative division of the province consists of 6 cities and 29 districts. Demak is one of them, which illustrates its geographical conditions has coastal areas with natural resources (SDA) that have the potential for development and sustainable activities [1]. If described about the astronomical location of the city of Demak, it is at coordinates 6043'26" - 7009'23" LS and 110027'58" - 110048'47" BT. The border itself involves Semarang City (west), Kudus Regency and Grobogan Regency (east), Java Sea and Jepara Regency (north), as well as Semarang Regency and Grobogan Regency (north). In addition, Demak Regency has an estimated beach length of 34.1 km with coverage to 13 villages [2]. One of the villages that is considered a coastal area in this district is Tambakbulusan Village which is precisely in Karangtengah

[1] Jesmond Sammut, "An Evaluation of the Engineering Suitability of Extensive Brackishwater Ponds in Barru, South Sulawesi Province, Indonesia," *Aquaculture and Fisheries* 8, no. 6 (2023): 644–53.

[2] Ahmad Romadon and Endah Subekti, "Teknik Budidaya Ikan Bandeng Di Kabupaten Demak," *Mediagro* 7, no. 2 (2011).

District. Given its position in the coastal area, Tambakbulusan village is one of the areas that needs attention. Coastal locations are often used for activities in improving welfare and community development. According to [3] areas with the main characteristics are coastal areas have high opportunities for development activities, on the other hand there are many renewable resources categories such as mangrove forests, other grasses, coral reefs, and those related to fisheries and unrenewable resources, namely energy and mineral resources [4].

Pond aquaculture is one of the activities carried out in improving welfare in coastal communities. Milkfish farming, shrimp and crab farming are typical pond farming products used by coastal communities, with milkfish cultivation being the most common [5]. According to [6] milkfish is a superior product that pockets a number of potentials and prospects are quite extraordinary, especially in the field of fisheries and marine industry of the country of Indonesia. Referring to data contained in the Ministry of Maritime Affairs and Fisheries from 2016 to 2020, pond fisheries production in Central Java is milkfish production in 2016 of 83,328.50 tons, in 2017 of 22,409.65 tons, in 2018 of 93,062.95 tons, in 2019 of 90,812.18 tons, in 2020 of 92,397.58 tons, shrimp production in 2016 of 26,888.18 tons, in 2017 of 25,395.53 tons, In 2018 it was 34,303.56 tons, in 2019 it was 35,209.84 tons, in 2020 it was 31,939.55 tons, and crab production in 2020 was 351.59 tons. Based on these data, milkfish is one of the commodities with a high production volume compared to other brackish water fish commodities. The level of public consumption of fish in Central Java has increased, namely 35.99 kg / capita / year (2019) and one year later, namely 2020, it reached 36.21 kg / capita

[3] Kurniawati Hapsari Ekosafitri, Ernan Rustiadi, and Fredinan Yulianda, "Pengembangan Wilayah Pesisir Pantai Utara Jawa Tengah Berdasarkan Infrastruktur Daerah: Studi Kasus Kabupaten Jepara," *Journal of Regional and Rural Development Planning (Jurnal Perencanaan Pembangunan Wilayah Dan Perdesaan)* 1, no. 2 (2017): 145–57.

[4] Stanley Iheanacho et al., "Microplastic Pollution: An Emerging Contaminant in Aquaculture," *Aquaculture and Fisheries*, 2023.

[5] Tony J Pitcher and David Preikshot, "RAPFISH: A Rapid Appraisal Technique to Evaluate the Sustainability Status of Fisheries," *Fisheries Research* 49, no. 3 (2001): 255–70.

[6] ASMAUL HUSNIYAH, "Analisis Finansial Pembesaran Ikan Bandeng (Chanos Chanos) Pada Tambak Tradisional Dengan Sistem Polikultur Dan Monokultur Di Kecamatan Mulyorejo, Surabaya, Jawa Timur" (Universitas Airlangga, 2016).

/ year. According to [7], the accumulation of fish product consumption in the provisional figure in 2015, precisely in Central Java, amounted to 22.35 kg / capita / year. In pond cultivation, there are types of biota that have advantages over freshwater biota, such as those owned by milkfish and shrimp. Milkfish in aquaculture activities have several advantages, one of which is able to adapt to the environment well and is resistant to disease. According to Marhawati and Ma'ruf (2018), the advantages of milkfish as a aquaculture commodity include having adaptability to high salinity (0-158 ppt), lack of cannibalism, and its ability or resistance to fish diseases. In addition to milkfish, shrimp also has advantages or advantages as is the case with milkfish. According to [8], shrimp, especially vaname shrimp, pocketed a number of superior values, including the relatively short estimated pet time (related to the process of growing and developing which is also relatively fast), high levels of productivity, tough to dispel disease, and not too problematic with shifting environmental conditions.

Tambakbulusan Village, Karangtengah District, Demak Regency is a village whose inherent characteristics are the livelihood of some residents as pond fishery cultivators, so Tambakbulusan village is included as one of the contributors to the increase or decrease in pond aquaculture production in Karangtengah District, Demak Regency. According to [9] stated that based on administrative data from the Tambakbulusan Village government related to the majority of the work of its residents, namely laborers and farmers, many implement land management to cultivate fish in ponds, including milkfish and shrimp. Milkfish cultivated in the Tambakbulusan Village area has the advantages of its delicious taste, savory and does not smell of mud and in terms of prices are fairly affordable for many people. As for if studied in terms of nutritional content, milkfish contains a protein composition of about 20-24%

[7] Iin Siti Djunaidah, "Tingkat Konsumsi Ikan Di Indonesia: Ironi Di Negeri Bahari," *Jurnal Penyuluhan Perikanan Dan Kelautan* 11, no. 1 (2017): 12–24.

[8] Wachidatus Sa'adah and Khiqotul Milah, "Permintaan Udang Vannamei (Litopenaeus Vannamei) Di Kelompok Pembudidaya Udang At-Taqwa Paciran Lamongan," *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis* 5, no. 2 (2019): 243–51.

[9] Izzah Nur Masyithoh and Ivo Novitaningtyas, "Pengaruh Digital Marketing Terhadap Minat Beli Konsumen Pada Marketplace Tokopedia," *Jurnal Manajemen & Bisnis Kreatif* 7, no. 1 (2021): 109–26.

(high) with a division of 2.25% for lysine and 1.23% amino acid glutamate [10], thus causing it to have a savory taste, besides milkfish also contains unsaturated fatty acids that can benefit the body is omega-3 to 14.2% of the total fat in milkfish (Nusantari et al ., 2016). In addition, shrimp also has good nutrition for the body. In vaname shrimp there are various nutritional contents, call it protein by 19.38%, then carbohydrates 6.10%, and fat content 0.82%. According to [11] shrimp such as vaname shrimp have a protein content that can reach 35%.

In aquaculture activities, ponds do not always experience success considering all aspects of the production process must be considered. The production of pond fisheries in Tambakbulusan Village cannot be separated from the lack of massimal production, resulting in a decrease in production output. The amount of pond fishery production from the last few years in Tambakbulusan village, Karangtengah district, has decreased which makes production results not optimal. Based on data from the Demak Regency Office (Demak Regency Open Data) states that the value of pond production in Karangtengah District in recent years has decreased, namely in 2018 by 1,613,419 kg, in 2019 by 2,711,646 kg, in 2020 by 760,464 kg, and in 2021 by 292,108 kg. According to [12] Demak Regency geographically intersects with the North Coast on Java Island as an area boundary whose flat conditions are fairly low (1-2 masl) bordering the North Coast of Java, so that the coastal area of Demak Regency often experiences tides, and pond damage that causes losses for pond cultivators. Aquaculture operations that ignore the carrying capacity of the ecosystem can also result in environmental damage, which can cause various problems, including tidal flooding. What is meant by tidal flooding can occur due to various possibilities, such as accumulation of household waste, not optimal drainage systems, soil degradation, depletion of locations designated as forestry areas,

[10] Banu Prasetyo and Umi Trisyanti, "Revolusi Industri 4.0 Dan Tantangan Perubahan Sosial," *IPTEK Journal of Proceedings Series*, no. 5 (2018): 22–27.

[11] W Soetjipto et al., "Peluang Usaha Dan Investasi Udang Vaname," *Jakarta: Direktorat Usaha Dan Investasi, Ditjen Penguatan Daya Saing Produk Kelautan Dan Perikanan, Kementerian Kelautan Dan Perikanan RI*, 2019.

[12] Romadon and Subekti, "Teknik Budidaya Ikan Bandeng Di Kabupaten Demak."

disturbed hydrological conditions, and tides [13]. According to [14], high input costs, climate change uncertainty, and deterioration in soil and air quality all contribute to the decline in aquaculture productivity.

This research was held because of concerns about the impact of decreasing the production of fishery products in Tambakbulusan Village. This decline needs to be found a solution so that it can meet fish consumption for each citizen, especially those concerning the Demak Regency area and can penetrate to its province, Central Java so that there is sustainability in pond aquaculture production in Tambakbulusan Village. The step that must be taken is that there must be sustainable aquaculture actions that are able to increase the production of fishery products, especially milkfish or shrimp farming. The decline in pond production, especially in pond aquaculture in Tambakbulusan Village, is caused by several aspects or dimensions, including those related to 2 (two) approaches to sustainability aspects, namely (1) social or cultural and (2) legal or institutional. Problems that occur in the social aspect or dimension, the problems that occur are related to the quality of human resources, where pond cultivators are considered to be still minimal, because the better the quality of human resources, the quality of production.

In the legal or institutional aspect or dimension, the problem that occurs is related to the lack of role of protecting institutions and financial institutions to help fish farmers. Based on this description, there is an alleged tendency that this condition is indicated to be unsustainable based on these aspects or dimensions, thus affecting the sustainability of available pond aquaculture. Thus, a scientific understanding of sustainability issues is needed that focuses on social or cultural dimensions as well as on legal or institutional dimensions. So that later it can improve the sustainability status of pond aquaculture in Tambakbulusan Village, Karangtengah District, Demak Regency.

[13] Sitti Marwah and L Alwi, "Analysis of the Impact of Land Use Change on Tidal Flood in Kendari City," *Int. J. Appl* 4 (2014).

[14] Mauli Sofi Agustin and Fuad Hasan, "Analisis Keberlanjutan Usaha Budidaya Bandeng," *Jurnal Ilmiah Mahasiswa Agroinfo Galuh* 8, no. 3 (2021): 737–51.

REGIONAL GEOLOGY

Aquaculture Fisheries

Speaking of coastal areas, in 2018 Indonesia has 108,000 km along the coastline, with potential cultivated land in marine aquaculture of 12,123,383 hectares, brackish aquaculture of 2,964,331 hectares and freshwater aquaculture of 2,830,540 hectares (Ministry of Fisheries and Fisheries/MMAF, 2021). Actually, there are many sectors in the field of fisheries with promising prospects, one of which is aquaculture in an effort to improve the economy so that sustainable fisheries management is necessary. However, until now Indonesia's aquaculture sector has many challenges. According to the Ministry of Fisheries and Fisheries / MMAF (2021) stated about the challenges faced by the Indonesian aquaculture sector, namely 1) Feed raw materials and medicines are still high depending on imports, 2) There are still few economical local seeds available, 3) Integrated aquaculture area centers are still not optimal from upstream to downstream, 4) Competent fish farmers are still low, 5) Stricter certification requirements by import countries, 6) Aquaculture hampered by licensing, 7) Ineffective integrated data collection system.

SUSTAINABLE MANAGEMENT

Sustainable Development and Concepts

The term sustainable development can be manifested into a constructive scheme that focuses on the fundamental principle of meeting current needs, without risking the interests of future generations. In this context, it contains three scopes or scopes of direction that are closely related to economic, environmental, and social development that are interdependent and strengthening [15].

Sustainable Fisheries Resource Management

The concept of sustainable fisheries development management arises because of indications of concerns about the decline in the ability of an aquatic environment while maintaining the availability of sustainable fishery resources.

[15] Muhammad Zulfikar and Aminah Aminah, "Peran Badan Nasional Penanggulangan Terorisme Dalam Pemberantasan Terorisme Di Indonesia," *Jurnal Pembangunan Hukum Indonesia* 2, no. 1 (2020): 129–44.

The concept of sustainable aquaculture itself has a meaning, namely the use of resources with the specific purpose of meeting a series of needs in the current generation while ensuring the use of the resources intended for future generations. Such statements launched information contained in the World Commission on Environmental and Development in 1987. In several years or from year to year aquaculture production has increased a lot. According to [16] aquaculture activities have increased compared to the previous 3 decades, which is around more than six times and is predicted to double in 2050. There are 5 main aspects in Indonesia in relation to controlling the development of fish farming sustainably based on an international perspective.

Social or Cultural Dimension

The socio-cultural dimension is that implementing fisheries development in a fairly long and sustainable period can answer basic questions about can the welfare of the population manifest into a social orientation.

Legal or Institutional Dimension

The legal or institutional dimension is a description of how the existence of an institution or regulatory device that can support the sustainability of fishery resources. Sustainability in this dimension focuses more on the existence of a regional regulation related to fisheries business management and government intervention in supporting the sustainability of fishery resources.

RESEARCH METHODS

Quantitative research supported by a qualitative data approach was decided to be applied as part of this research method. The application of methods to collect data related to research needs is by observation, documentation, and question and answer sessions with questionnaires aka interviews. Primary data collection activities through the distribution of questionnaires and interviews to 47 respondents. The selection of respondents was carried out by proportional stratified random sampling based on involvement in aquaculture management activities. The respondents involved consisted of pond fishery cultivators and employees of the Marine and Fisheries Service of Demak Regency. Secondary

[16] Rohana Subasinghe, "Regional Review on Status and Trends in Aquaculture Development in Asia-Pacific-2015," *FAO Fisheries and Aquaculture Circular*, no. C1135/5 (2017): I.

data were obtained from literature studies obtained from the Marine and Fisheries Service of Demak Regency and the Demak Regency Statistics Agency. The data obtained is in the form of annual data describing aquaculture activities of pond fisheries. The research data was analyzed using Multidimensional Scalling Rapid Appraisal for Fisheries (MDS RAPFISH). [17] in [18] stated, MDS-Rapfish is used in evaluating fisheries sustainability by modifying Rapfish in a multidimensional manner

RESEARCH RESULT

Sustainability of Pond Aquaculture in Tambakbulusan village, Karangtengah District, Demak Regency

In the MDS Rapfish analysis, the results obtained in determining the index and sustainability status can be seen in the results of the Rapfish Ordination on each dimension analyzed. Rapfish Ordination shows a sustainability index ranging from 0-100% plotted on two orthoghonal axes that have two axes, namely horizontal and vertical [19]. These axes have meanings that show the results of the sustainability index. RAPFISH ordination is placed on a two-dimensional curve, where only the horizontal dimension (X-axis) has significance in ordination, while the vertical dimension (Y-axis) only provides variations in attributes (indicators) and is not related at all to the degree of sustainability [20]. Based on the results of MDS RAPFISH, the results of the sustainability index are obtained on the social or cultural dimension, and the legal or institutional dimension as follows:

1. **Social or Cultural Dimension**

   Based on the results of the *multidimentioanal scalling* Rapfish (MDS RAPFISH) analysis, the sustainability status of pond aquaculture in

[17] Pitcher and Preikshot, "RAPFISH: A Rapid Appraisal Technique to Evaluate the Sustainability Status of Fisheries."

[18] Yuyun Erwina, Rahmat Kurnia, and Yonvitner Yonvitner, "Status Keberlanjutan Sumber Daya Perikanan Di Perairan Bengkulu," *Jurnal Sosial Ekonomi Kelautan Dan Perikanan* 10, no. 1 (2015): 21–34.

[19] Muhammad Yusuf et al., *MDRS-RAPS: Teknik Analisis Keberlanjutan* (TOHAR MEDIA, 2021).

[20] Fitriya Fauzi and Stuart Locke, "Board Structure, Ownership Structure and Firm Performance: A Study of New Zealand Listed-Firms," 2012.

Tambakbulusan village on the social or cultural dimension of the 7 (seven) attributes used resulted in a sustainability index value of 61.44 (Figure 1).

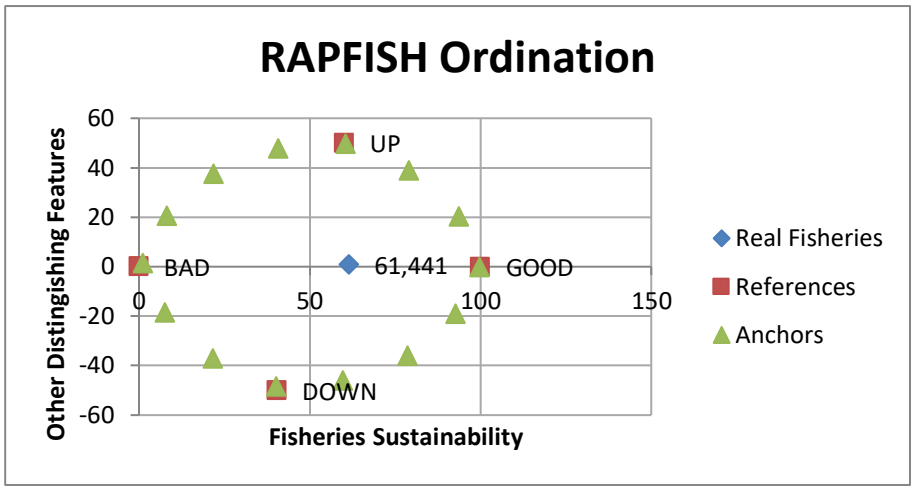


Figure 1. The Value of the Sustainability Index on the Social or Cultural Dimension

Based on the results above, the sustainability index value of pond aquaculture in Tambakbulusan village on the social or cultural dimension is in the range of 50.01 – 75.00 on the sustainability index scale of 0 – 100, which means that this social or cultural dimension is also included in the category of "moderately sustainable" This also shows that in the social or cultural dimension attributes that have been used in sustainability testing, the social or cultural dimension is also sufficient to provide support for the sustainability of pond aquaculture in Tambakbulusan village. Although the performance of the social or cultural dimension is sufficient to support the sustainability of pond aquaculture in Tambakbulusan village, improvement of each attribute in this predetermined social or cultural dimension must be done, so as to make the sustainability of aquaculture in Tambakbulusan village in the social or cultural dimension lead to a better level of sustainability.

Leverage analysis on 7 (seven) attributes of social or cultural dimensions, namely cultivation business experience, education level, family participation in cultivation business, participation in development forums, labor absorption,

support for fisheries extension workers, and conflict. Based on the leverage analysis, the results are obtained in Figure 2.

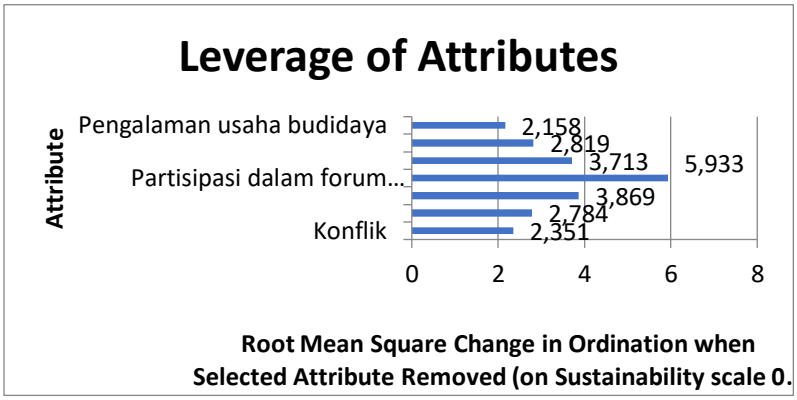


Figure 2. Results of Leverage Analysis on Social or Cultural Dimensions

Based on the results above, the main or most influential sensitive attribute is the participation attribute in the development forum (RMS = 5.933), then based on the middle value law (5.933: 2 = 2.966) then the attribute with an RMS value above 2.965 is also included in the sensitive attribute or influential attribute, namely the labor absorption attribute (RMS = 3.869) and the family participation attribute in the cultivation business (RMS = 3.713). But other attributes are also influential that should not be ignored. The sessiveness attribute or attribute that has the most influence on the social or cultural dimension is participation in the development forum. Based on interviews that have been conducted, the participation of cultivators in the development of pond aquaculture in Tambakbulusan village, most of them are enthusiastic about participating if there is a development forum, both internal and external, so as to make the sustainability status of pond aquaculture in Tambakbulusan village get a fairly sustainable value. According to [21], participation is a very important and decisive element in efforts to achieve development success.

One of the development forums that has occurred in Tambakbulusan village is the development of good and correct aquaculture (CBIB). Labor absorption is

[21] Pamela Mikaresti and Herlinda Mansyur, "Pewarisan Budaya Melalui Tari Kreasi Nusantara," *Gorga: Jurnal Seni Rupa* 11, no. 1 (2022): 147–55.

the next sensitive attribute that affects the sustainability of pond aquaculture in Tambakbulusan village. Based on the results of the interview that the absorption of labor by farmers in Tambakbulusan village is only carried out during harvest, while for production the farmers do not absorb labor, and the absorption of labor carried out is usually at least 1 depending on the number of existing harvests and the capital owned. This makes the main factor also increase in the sustainability of cultivation because the large absorption of labor also shows an increase or growth in a business. According to [22], the company's demand for labor depends on the increase in public demand for goods or services produced. Labor absorption has also been related to social relations because labor absorption involves many people in management. According to [23], labor absorption can reduce unemployment because it involves many parties so as to make maximum management and can have a positive impact on the welfare of parties who play a role in aquaculture activities. Family participation in aquaculture activities is also a sensitive attribute that is influential in pond aquaculture in Tambakbulusan village. In relation to the results of research conducted that there is some participation of family members in aquaculture in Tambakbulusan village, so it can be said that pond aquaculture activities are included in family business activities. According to [24], in general, in a family company, the role of the family occupies a strategic position, especially in maintaining business continuity. Family participation also has an important role in a business. The function of family participation, namely family social support provided can be in the form of providing emotional support, assessment, instrumental and information that can

[22] Achma Hendra Setiawan, "Analisis Penyerapan Tenaga Kerja Pada Sektor Usaha Kecil Dan Menengah (UKM) Di Kota Semarang," *JEJAK: Jurnal Ekonomi Dan Kebijakan* 3, no. 1 (2010).

[23] victor Muhammad Ramadhan and AGUS Trilaksana, "Perkembangan Perikanan Dari Budidaya Tradisional Ke Budidaya Modern Di Kabupaten Sampang Tahun 2003–2017," *Avatara* 7, no. 1 (2019).

[24] Endar Budi Sasongko, Endang Widyastuti, and Rawuh Edy Priyono, "Kajian Kualitas Air Dan Penggunaan Sumur Gali Oleh Masyarakat Di Sekitar Sungai Kaliyasa Kabupaten Cilacap," *Jurnal Ilmu Lingkungan Undip* 12, no. 2 (2014): 72–82.

help in regulating thoughts, feelings and behaviors to respond to existing pressures [25].

2. Legal or Institutional Dimension

The calculation results based on *multidimentioanal scalling* Rapfish (MDS RAPFISH) the sustainability status of pond aquaculture in Tambakbulusan village on legal or institutional dimensions against the 6 (seven) attributes used, resulting in a sustainability index value of 42.90 (Figure 3).

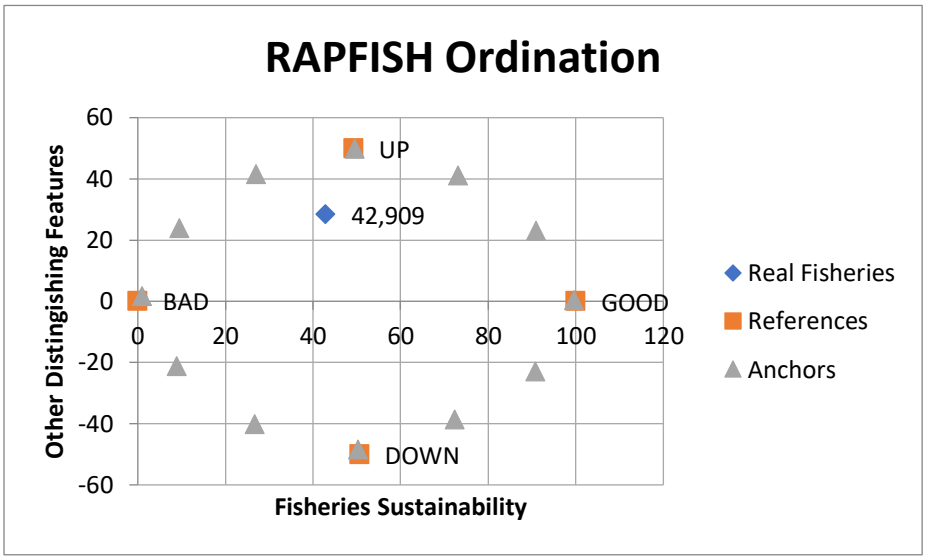


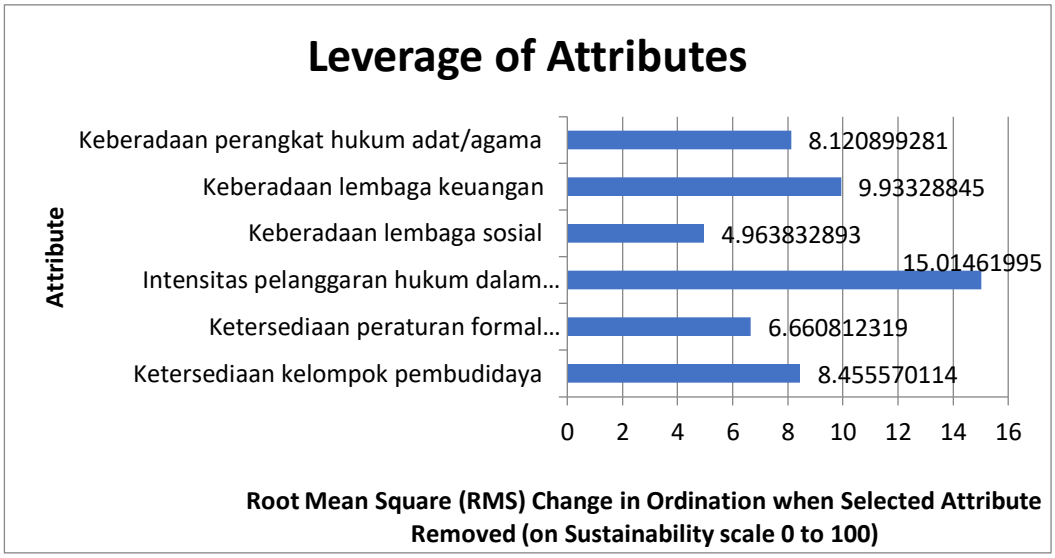
Figure 3. The Value of the Sustainability Index on the Legal or Institutional Dimension

Based on Figure 6, the sustainability index value of pond aquaculture in Tambakbulusan village in the legal or institutional dimension is in the range of 25.01 – 50.00 on the sustainability index scale of 0 – 100, which means that this social or cultural dimension is also included in the category of "less sustainable"

[25] Karina Putri Utami and Yeny Duriana Wijaya, "Hubungan Dukungan Sosial Pasangan Dengan Konflik Pekerjaan-Keluarga Pada Ibu Bekerja," *Jurnal Psikologi: Media Ilmiah Psikologi* 16, no. 1 (2018).

[26]. Leverage analysis of legal or institutional dimensions on the sustainability of pond aquaculture in Tambakbulusan village on 6 (six) attributes, namely the availability of cultivator groups, the availability of formal regulations for aquaculture management, the intensity of legal violations in relation to aquaculture, the existence of social institutions, the existence of financial institutions and the existence of customary/religious legal instruments. Based on the leverage analysis, the results of the leverage analysis can be seen in Figure 4.

Figure 4. Results of Leverage Analysis on Legal or Institutional Dimensions



Based on the results above, the results of the leverage analysis of legal or institutional dimensions on the sustainability of pond aquaculture in Tambakbulusan village, Karangtengah district, Demak regency based on the results above, obtained the results of sensitive attributes (the most influential attributes), namely the intensity of violations of law in relation to cultivation, the existence of financial institutions, the availability of cultivator groups and the

[26] M Thamrin, Catur Herison, and Supiandi Sabiham, "Analisis Keberlanjutan Wilayah Perbatasan Kalimantan Barat-Malaysia Untuk Pengembangan Kawasan Agropolitan," *Jurnal Agro Ekonomi* 25, no. 2 (2007): 103–24.

existence of customary/religious legal instruments. The attribute of intensity of violations of the law in relation to aquaculture is the main sensitive attribute that affects the sustainability of pond aquaculture in Tambakbulusan village which makes the sustainability status less sustainable. Based on information obtained from farmers in Tambakbulusan village, violations of the law that occur are external violations of cultivation activities, namely the existence of perpetrators of tambak embankment destruction, where the embankment destroyers or ripens catch wild biota in the cultivation pond intensely and without the knowledge of the pond owner.

This makes the occurrence of pond destruction unavoidable, especially on embankments or pond ripens, due to the absence of strict supervision in pond cultivation in Tambakbulusan village. The embankment or pond maturity itself has an important role in maintaining the existence of the pond. The ripen in a pond unit, functions as a water barrier from inside or outside the map, so that if the ripen has a low and narrow size and is not neat, the breastfeeding is sometimes easy to leak and break [27]. Based on the results of research that has been conducted that there is no financial institution in the area. This makes one of the factors that make the sustainability status of the legal or institutional dimension less sustainable. According to [28], a financial institution is an institution that facilitates the exchange of goods and services with the use of money or credit and helps distribute savings of some people to some people who need financing funds for investment. The existence of financial institutions themselves has an important role because they can help the general Tambakbulusan village community, and help farmers in particular in managing pond fisheries to improve sustainability status. Based on the results of research that has been conducted and information from the Tambakbulusan village hall that in Tambakbulusan village there are groups of fishery cultivators numbering more than 3 groups of cultivators and are more than 5 years old.

[27] A H Sambu, "Optimasi Pengelolaan Tambak Wanamina (Silvofishery) Di Kawasan Pesisir Kabupaten Sinjai," *Disertasi. Sekolah Pascasarjana. IPB. Bogor*, 2013.

[28] Muh Anshori, "Lembaga Keuangan Bank: Konsep, Fungsi Dan Perkembangannya Di Indonesia," *Madani Syari'ah* 1, no. 1 (2019): 91–102.

Pokdakan or group of farmers is a group of fish farmers who are organized, have administrators and rules in group organizations that directly carry out fish farming. The cultivator group in Tambakbulusan village itself is still quite active in several cultivator groups. The existence of this group of cultivators is very important because the group has many benefits, but if there is no activity from these members, it can decrease the quality of cultivation carried out in an area. According to the regulation of the Minister of Agriculture Number 82 of 2013 states that the function or role of pokdakan consists of three task functions, namely learning classes, cooperation vehicles and production units [29]. The last sensitive attribute on the legal or technological dimension of the sustainability of pond aquaculture in Tambakbulusan village is the existence of customary/religious legal devices. Customary law is as a whole of regulations that are incarnated in the decisions of legal functionaries who have authority and have influence in their implementation, apply immediately (spontaneously) and are obeyed wholeheartedly. The results obtained from research related to the existence of customary/religious law tools in Tambakbulusan village itself do not have it, so that if there is a violation committed by someone, it is difficult to provide a sanction so that it can cause many violations both in the production of pond aquaculture and outside the production activities of pond aquaculture in Tambakbulusan village. Although there is no customary / religious law in Tambakbulusan village, at least there needs to be a village regulation that can regulate violations committed by someone, especially in the production of pond aquaculture in Tambakbulusan village.

Test the Validity and Accuracy of MDS RAPFISH on Social or Cultural Dimensions and Institutional or Legal Dimensions

According to [30] Monte Carlo analysis is a statistical simulation method to evaluate the effects of random errors on a process and to estimate the true value of statistical interest. Furthermore, to see the error rate in the MDS RAPFISH

[29] Mely Cahya Puspita and Aryo Fajar Sunartomo, "Peran Kelompok Pembudidaya Ikan (Pokdakan) Aci Bahari Dalam Pembudidayaan Ikan Bandeng Di Desa Pesisir Kecamatan Gending, Kabupaten Probolinggo," *Jurnal Sosial Ekonomi Pertanian (J-SEP)* 12, no. 2 (2019): 80–91.

[30] Patricia Kavanagh and Tony J Pitcher, "Implementing Microsoft Excel Software for Rapfish: A Technique for the Rapid Appraisal of Fisheries Status," 2004.

analysis, a validity test was carried out with the monte carlo method with a confidence level of 95% or an error rate of 5%. Validity is carried out by comparing the value of the results of the MDS analysis or the value of the sustainability index with the results of the monte carlo analysis or vice versa. The results of this comparison if the difference is small, the impact of variations in multiple scoring on attributes is relatively small, assessment with MDS repeatedly becomes stable, data error or data loss becomes relatively small. Based on the results of monte carlo analysis on the dimensions studied, it can be known that the comparison of the results of MDS analysis or sustainability index and monte carlo analysis, can be seen in Table 1.

Table 1. Differences or differences in MDS RAPFISH sustainability index values with Monte Carlo analysis

Dimension	Multidimentional Scalling (MDS)	Monte Carlo (MC)	Discrepancies or Discrepancies (%)
Social or Cultural	61,441	60,468	0,973
Legal or Institutional	42,909	43,668	0,759

Based on the results of monte carlo analysis and MDS analysis with a 95% confidence level above, it was obtained that the value of the sustainability index of pond aquaculture in Tambakbulusan village showed a difference in value ranging from 0.759 – 0.973. This means that the simulation of calculating the validity value of the sustainability of pond aquaculture in Tambakbulusan village using RAPFISH has a high level of confidence or it can be said that the resulting MDS RAPFISH analysis model is adequate to estimate the value of the sustainability index of pond aquaculture in Tambakbulusan village. According to [31] if the difference value of these two analyses is >5%, then the results of MDS analysis are inadequate as an estimation of the value of the sustainability index,

[31] Kavanagh and Pitcher.

and vice versa if the value of the difference between the two analyses is <5%, then the results of the MDS analysis are adequate to estimate the value of the sustainability index.

In the results of MDS RAPFISH analysis, there are stress values and determinant coefficient values (R2 / RSQ) in each dimension tested. The stress value is interpreted as a measure of error (lack of fit or error), namely the smaller the stress value, the smaller the error between the distance and the similarity value of the space presented, and the value of the determinant coefficient (R2 / RSQ) basically measures how far the ability of a model can explain the variation of the dependent variable (dependent variable) [32]. Based on the MDS RAPFISH analysis that has been carried out on 2 (two) dimensions tested, the results of stress values and determinant coefficients (R2 / RSQ) in each dimension are listed in Table 2.

Table 2. Stress Value and Coefficient of Determination (R2) Results of MDS RAPFISH Sustainability of Pond Aquaculture in Tambakbulusan Village

Dimension	Sustainability Index Value	Stress Value	Value of Coefficient of Determination (R^2/RSQ)
Social or Cultural	61,441	0,145	0,943
Legal or Institutional	42,909	0,142	0,932

Based on the results above, it is known that the stress value in the 4 (four) dimensions used is around 0.142 -0.145. These values indicate that the attributes used in assessing the sustainability status of each dimension are adequate. All attributes used in the assessment of sustainability status are considered adequate (good and fit) and can be accounted for if the stress value is < 0.25, while the value of the coefficient of determination (R2/RS) is close to 1.0.

[32] Setiawan, "Analisis Penyerapan Tenaga Kerja Pada Sektor Usaha Kecil Dan Menengah (UKM) Di Kota Semarang."

CONCLUSION

Based on the results of MDS RAPFISH which was reviewed, the sustainability of pond aquaculture in Tambakbulusan Village in the social or cultural dimension is included in the category of moderately sustainable with a sustainability index value of 61.44, and in the legal or institutional dimension the sustainability status of pond aquaculture in Tambakbulusan Village is included in the less sustainable category because it has an index value of 42.90. Sensitive attributes (the most influential attributes) on the social or cultural dimension are attributes of participation in development forums, labor absorption, and family participation in cultivation businesses, while sensitive attributes on legal or institutional dimensions are attributes of the intensity of legal violations in relation to cultivation, the existence of financial institutions, the availability of cultivator groups, and the existence of customary or religious legal instruments.

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