International Journal of Applied Business & International Management (IJABIM)
Vol. 9 No. 2, pp. 335-348, August, 2024
E-ISSN: 2621-2862 P-ISSN: 2614-7432
https://www.ejournal.aibpmjournals.com/index.php/IJABIM

Analysis of Market System Mapping Patterns and Potential for Milkfish Cultivation in Pangkahwetan Village

Nurman Setiawan Fadjar[1], Risqi Noor Hidayati Putri[2]
Faculty of Economics and Business Universitas Brawijaya, Malang, Indonesia[1]
Faculty of Economics and Business Universitas Negeri Surabaya, Surabaya, Indonesia[2]
Corresponding Author: nurman@ub.ac.id

ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Fadjar, N. S., & Putri, R. N. H. (2024). Analysis of market system mapping patterns and potential for milkfish cultivation in Pangkahwetan Village. *International Journal of Applied Business & International Management*, *9*(2), 335-348.

DOI:
https://doi.org/10.32535/ijabim.v9i2.2191

Received: 18 June 2024
Accepted: 21 July 2024
Published: 20 August 2024

ABSTRACT

One of the common species for aquaculture in Indonesia is milkfish (*Chanos chanos*). Pangkah Wetan Village in Gresik Regency is one of the areas that have the potential or value for milkfish aquaculture, which is influenced by the majority of the population who have a livelihood in the fisheries sector and milkfish is relatively easy to cultivate due to its fast growth. This research examines the potential of milkfish, the milkfish market system, and the strategy for developing milkfish cultivation through an analysis of the market system approach. The analysis is carried out to identify the various barriers that exist in the market system and to place the focus on how to overcome these obstacles. It was discovered that the cause of the low productivity of milkfish aquaculture was due to limitations in supporting services, not in the actors. The basic causes of this productivity include various seedlings' quality, limited artificial feed, low utilization of technology, low access to capital, low marketing levels, and the minimal role of related institutions. Hence, systemic intervention is necessary in terms of support services in order to improve the welfare of the community which in turn will increase the income of farmers.

Keywords: Aquaculture; Milkfish; Market Potential; Market System; Support Function

INTRODUCTION

The trend of demand for fish in the world is increasing year by year due to the increasing population and changes on people's consumption patterns along with the increasing quality of life. Central Agency of Statistics (BPS, 2021) declared that fishery resources in Indonesian seas cover 37 percent of the world's fish species, several of which have high economic value. The utilization of fishery and marine resources is not limited not only to catching fish in the waters but also to applying fishery resources in aquaculture. The type of fish that is widely developed through cultivation is milkfish. In Indonesia, milkfish cultivation has long been carried out by pond producers both extensively and intensively. Indonesia managed to occupy the first position as the largest milkfish-producing country in the world in 2011 with a share of 52.4 percent of the world's milkfish production (Fishstat FAO 2013 in Ula & Kusnadi, 2017). Milkfish production can be found in almost all provinces in Indonesia. Milkfish cultivation is mainly produced in Java, especially East Java, West Java, and Central Java.

The highest milkfish production is in East Java region, with an average of 136,966.74 tons per year during 2011-2020 or equivalent to 21.4 percent of the total production, followed by South Sulawesi of 133,692.1 tons (20.9 percent), and West Java of 85,088.04 tons (13.3 percent). Milkfish production in East Java is almost spread across 38 regencies/cities, where the highest production is in Sumenep, Gresik, and Sidoarjo areas (Indonesia. Minister of Marine Affairs and Fisheries [KKP RI], 2020)

Law Number 6 of 2014 about Villages, grants authority to Villages, including authority based on origin rights and village-scale local authority (Indonesia. The Audit Board [BPK RI], 2014). Through this regulation, the government seeks to increase the village's financial capacity through village fund transfers. The impact of the Village Fund has a significant influence on village development. One of them can be seen through changes in village status from year to year. The number of villages with very disadvantaged status and underdeveloped status decreased. On the other hand, villages with developing, advanced, and independent status are always increasing. The status of village progress and independence is a measure of village classification in order to determine interventions, both budgets and development policies.

Generally, the strengthening of village capacity is oriented to increase rural productivity, namely local economic development through increasing village economic activities based on superior commodities. Pangkahwetan Village, Gresik Regency is one area that has a quite large potential or value for milkfish production. The production value of milkfish from cultivators always increases every year, which is influenced by the fact that most of the population live in fishery sector and that milkfish is relatively easy to cultivate, to grow fast, able to live in a high salinity range (euryhaline), and that milkfish also have a promising economic value, especially for the local market, as household or restaurants consumption, as well as raw materials for food industries (Winarsih et al., 2011).

Besides, there are problems faced by milkfish cultivators in aquaculture. First, internal problems such as limited good quality seeds, relatively high feed prices, and limited access to capital. Second, external problems such as asymmetric inter- and intra-sectoral regulations and licensing as well as climate change and environmental degradation (KKP RI, 2020).

To support the successful implementation of marine and fisheries development, area-based integrated activities have been developed with the Minapolitan concept. The Minapolitan area is an area developed with a concept that emphasizes the advancement of the fisheries sector with the aim of making the marine and fisheries economic sector

a driving force for the regional economy. Out of the 38 regencies/cities in East Java, 14 regencies/cities have been designated as minapolitan areas. This decision also stipulates the type of development of the minapolitan area, which is divided into minapolitan aquaculture and minapolitan capture fisheries.

As previously explained, the largest production of milkfish one of them is in Gresik. Based on the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 35 of 2013 [BPK RI, 2013], Gresik Regency was designated as a minapolity area for aquaculture. Deriving from the description above, this phenomenon is interesting to be studied. This study examines the analysis of market system mapping patterns and potential for milkfish cultivation in Pangkahwetan Village, Gresik. The purpose of this research is to identify the potential and problems related to the function of market system in milkfish development and to formulate a developmental strategy to increase farmers' income.

LITERATURE REVIEW

Fishery, like other economic sectors, is an activity that contributes to the welfare of the community. Fisheries are all organized activities related to the management and utilization of fishery resources and their environments from pre-production, production, and processing to marketing, which are carried out in a fishery business system according to Law of the Republic of Indonesia Number 45 Year 2009 (BPK RI, 2009). Hendri in Aziz (2013) stated that marine and fisheries business opportunities can be seen from at least two factors, namely internal factors and external factors. Internal factors are the potential of marine and fishery resources, the potential of human resources, technology, facilities, and infrastructure. External factors are in the form of aspects related to demands for fishery products and demands' conditions in competition.

Local Economic Development (LED) is an effort to empower communities in an area by relying on local strengths, be it location strength, natural resources, human resources, technology, institutional management capabilities, and experience assets (Haeruman, 2005). Milkfish cultivation is one of the regional economic development efforts. The milkfish fisheries sector is the base sector in Teluknaga District and the factors that significantly affect the production of milkfish aquaculture are seeds, feed, land area, and labor (Budiyanto, 2014).

The focus of the market system is on the system of change, driven by an understanding of the main barriers (causes). The priority is to identify and address any bottlenecks in the system that could lead to broader changes involving players and other activities. The market system approach emphasizes clearly that the role of intervention is temporary and catalytic. These institutions should not play a direct market role and continually facilitate the market players to perform more effectively. The market system approach focuses on the main causes and potential drivers for sustainability and the emergence of large-scale impacts.

Fisheries development is essentially aimed at increasing the income of fish farmers as well as expanding business opportunities, increasing the production and productivity of fish farmers' businesses, increasing exports of fishery products, and increasing fish consumption for the community. Farming patterns and pond cultivation technology are expected to help to increase production and optimal land use.

Increasing milkfish production can be done through intensification and extensification. Intensification is an increase in production without adding to natural production factors but based on the capabilities of existing production factors such as the use of superior

seeds, the use of fertilizers at the right time, regular irrigation, and the use of technology and a skilled workforce. Extensification is increasing production by adding natural production factors, labor, and capital such as increasing land area, labor, and equipment. Milkfish pond farming with a semi-intensive rearing system (technology) is more profitable than the traditional rearing system (Yusuf, 2007). In line with the results of research by Ula and Kusnadi (2017) which suggest that semi-intensive technology provides a higher and more profitable level of productivity. However, traditional technology is more efficient. This condition makes milkfish cultivation with traditional technology still survive because it provides a higher return to capital even though it has a higher risk.

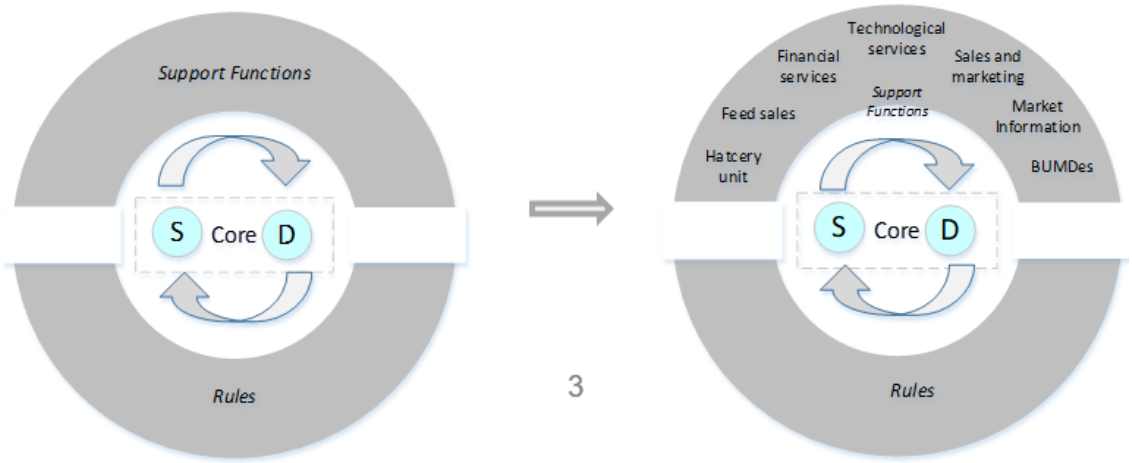
The objective of milkfish enlargement efforts is to achieve high production, quality, and profit while still paying attention to aspects of business and resource sustainability. The strategy for developing milkfish cultivation can be done in several ways based on ecological, social, economic, and institutional aspects (Jamal et al., 2018). Meanwhile, according to Hikmayani and Putri (2014), the strategy in developing the international market for milkfish is through intensification of cultivation in potential locations and infrastructure development in production center locations.

RESEARCH METHOD

The research location is in Kampong Bandeng of Sumber Suci Sub-village, Pangkahwetan Village, Ujungpangkah District, Gresik Regency, taking into account that Pangkahwetan Village is one area that has a large enough potential or value for milkfish production. Primary data was obtained through direct observation with questionnaires and interviews to identify the potential and problems related to the functioning of the market system in milkfish development. Secondary data was obtained from various relevant literature to describe the research area through a literature study. Furthermore, SWOT analysis is used to determine the potential and development problems that are used to determine the direction of cultivation potential development by looking at strengths, weaknesses, opportunities, and threats. So, this research is a descriptive study through a qualitative approach by analyzing, describing, and summarizing various conditions, and situations from various data collected in the form of interviews or observations about the problems studied that occur in the field through a market system approach that focuses on support functions.

The market system approach is a development that provides guidance not only on how to understand the underprivileged communities in the market system (in the form of analysis), but also on how to bring about effective change (in the form of action). The market system emphasizes its multi-functional and multi-actor nature, especially on the three main functions that make up the market system, the core function between providers and consumers (or a series of actors in the value-added path in the value chain), formal and informal rules that hinder the formation of the market behavior and information, services and other functions that support exchange.

Figure 1. Market System: Support Function



Source: BEAM Exchange, SDC, and DFID (2015)

Supporting functions in this study include hatchery units, feed sales, financial services, technological services, sales and marketing, market information, and village-owned enterprises (BUMDes). Through a market system approach, identifying and overcoming all obstacles to the system that can lead to wider changes involves related parties. The market systems approach purpose to produce large-scale change. Some of the interventions may seem minor, but they must always control the actions of major market players to effect extensive change. Sustainability is a key concern of this market systems approach. This means not only considering the alignment that already exists between the market functions and the players but also how they can work more effectively in the future, given the incentives and capacities of the players in playing their various roles.

RESULTS

Gresik Regency is a plain area bordering the coast. Part of Gresik Regency is a coastal area with a coast length of 140 km, 69 km on the mainland of Java Island that extends, and 71 km on Bawean Island. Gresik is an area that has the potential to grow rapidly in the Surabaya Metropolitan Area constellation, where the urban area that is directed as a National Activity Center in East Java Province is the Gerbang Kertosusila Urban Area (Gresik - Bangkalan - Mojokerto - Surabaya - Sidoarjo - Lamongan). Based on the spatial pattern of Gresik area, it is divided into two, namely the conservation area and the cultivation area. Cultivation areas have an area around 96.83% of the total area in Gresik Regency with leading sectors including agriculture, fishery, industry, tourism, geothermal, oil, and gas.

Administratively, Gresik Regency is divided into 18 Districts, 330 Villages, and 26 wards. In line with the leading sector of Gresik Regency, fishery, one of the main occupations of the population is as a fish farmer scattered throughout Gresik Regency. Utilization of fishery and marine resources is not limited not only to catch the fish in the water but also to use fishery resources in aquaculture. Aquaculture production in Gresik Regency in 2019 increased to 131,195.47 tons. Meanwhile, capture fisheries production in 2019 increased to 33,403.09 tons. Since 2012, Gresik Regency has been named as a minapolitan area for aquaculture based on the Decree of the Minister of Marine Affairs and Fisheries Number 35 of 2013, with shrimp and milkfish as superior commodities. This is in line with the development of fisheries areas for both capture and cultivation which are directed at six sub-districts, one of which is Ujungpangkah District (Gresik Regency Spatial Plan 2020-2030).

International Journal of Applied Business & International Management (IJABIM)
Vol. 9 No. 2, pp. 335-348, August, 2024
E-ISSN: 2621-2862 P-ISSN: 2614-7432
https://www.ejournal.aibpmjournals.com/index.php/IJABIM

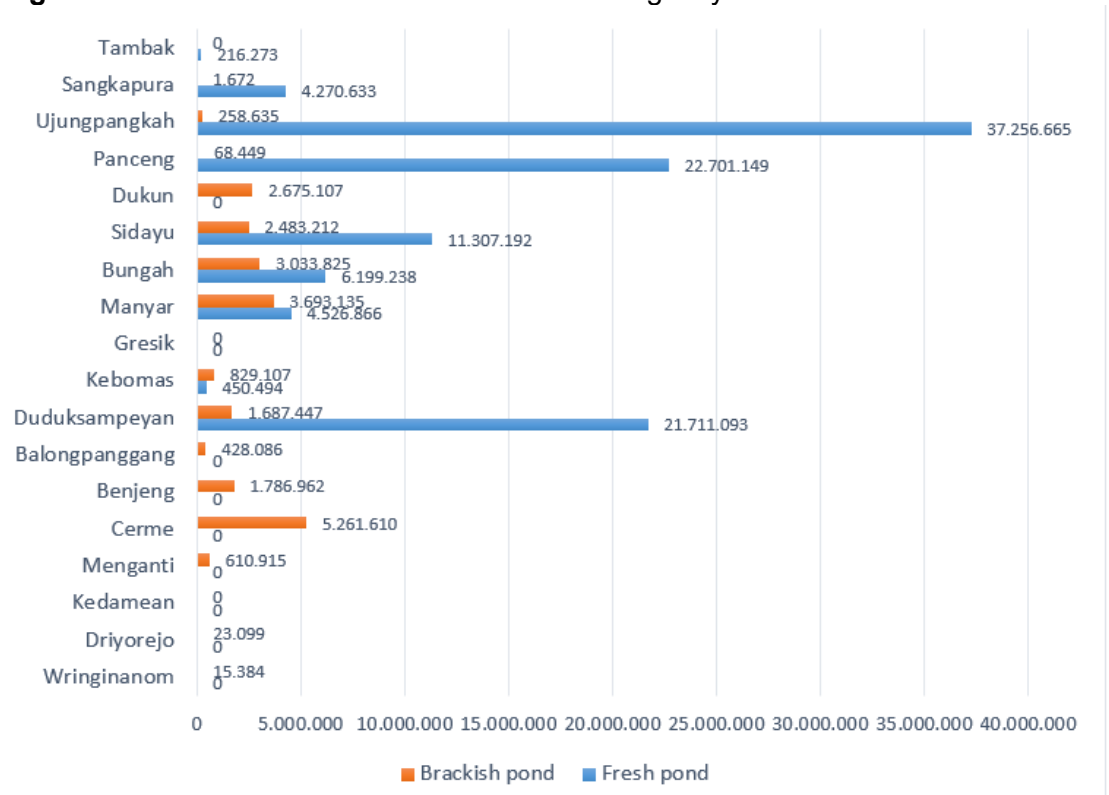
Table 1. Fishery Production in Gresik Regency (tons)

Description	2017	2018	2019
Aquaculture	128,571.56	129,214.42	131,195.47
Capture fisheries	19,500.16	23,458.45	33,403.09

Source: Gresik Regency (2021)

The main commodity owned by Gresik Regency is milkfish. Fishery production has increased from year to year because Gresik Regency has the largest expanse of ponds in the East Java region and is the only district in East Java that has been designated as a pilot for the development of aquaculture through an aquaculture industrialization program with main commodities of milkfish and shrimp (BPS, 2020).

Figure 2. Cultivated Fish Production of Gresik Regency in 2021



Source: BPS, processed in 2022

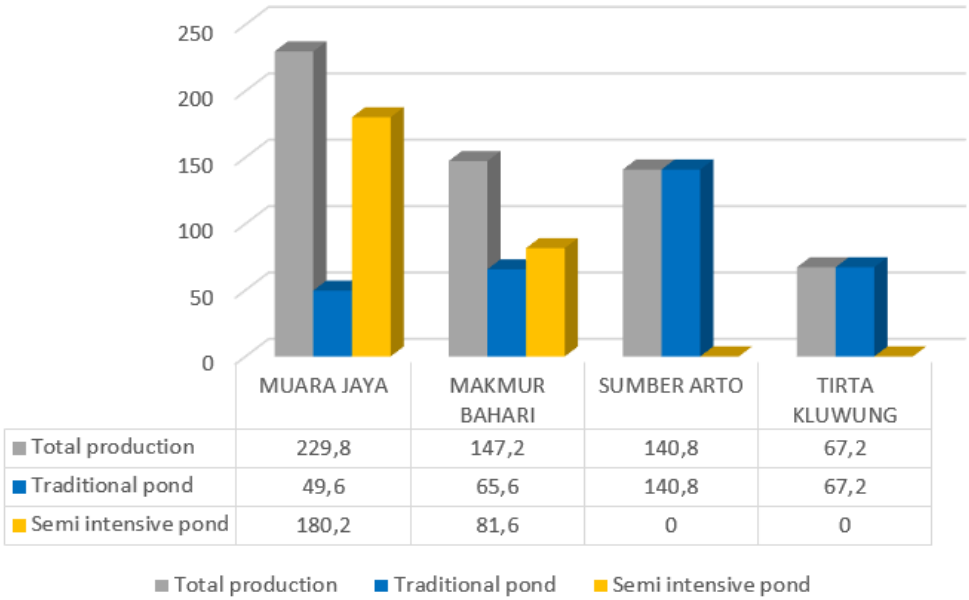
Ujungpangkah is one of the sub-districts located on the coast which has 13 villages/urban villages. In 2020, the population reached 48,955 people (4 percent of the total population of Gresik Regency), where the largest population is in Pangkahwetan Village as many as 9,882 people. In 2021, Ujungpangkah Subdistrict had a total of 1,713 fish farmers (8.4% of the total population of Gresik Regency). The majority of the working population in Ujungpangkah District is on agricultural sector (including fisheries), which is about 56 percent of the total population of Ujungpangkah District. It is in line with the agricultural area which is quite large, which reaches 34 percent, and the aquaculture area which reaches 18 percent of the total area of Gresik Regency. The production of brackish aquaculture fish in Ujungpangkah District reached 37,256 tons (including milkfish) in 2021, while the production of freshwater aquaculture fish reached 258 tons such as catfish, tilapia, and others.

Pangkahwetan is one of the villages in Ujungpangkah Sub-district which consists of 4 sub-villages, 17 hamlets, and 44 neighbourhoods. The four sub-villages in Pangkahwetan Village are Tajungrejo, Sumber Suci, Krajan 1, and Krajan 2. Most of the

Pangkahwetan Village area is used for ponds, one of which is in Kampong Bandeng, Sumber Suci Sub-village. The area of cultivation potential is quite large, namely 2,465.49 ha, so that many people work as pond cultivators, that is as many as fishery households (Pangkahwetan Village, 2022).

Kampong Bandeng of Sumber Suci Sub-village has a pond area of 284.4 hectares, 278 hectares for grow-out farms, and 6.8 hectares for nursery. The pond area is managed by six groups of fish cultivators (Pokdakan), namely Pokdakan Muara Jaya (83 ha), Makmur Bahari (65 ha), Sumber Arto (88 ha), Tirta Kluwung (42 ha), Milkfish Makmur (3 ha), and Berkah Mandiri (3.8 ha). Total milkfish production reaches 585 tons per year. The production value is divided into traditional pond production reaching 323.2 tons per year and semi-intensive pond production reaching 261.8 tons per year managed by four growing out of Pokdakan.

Figure 3. Total Production Based on Pokdakan (Tons/Year)



	MUARA JAYA	MAKMUR BAHARI	SUMBER ARTO	TIRTA KLUWUNG
Total production	229,8	147,2	140,8	67,2
Traditional pond	49,6	65,6	140,8	67,2
Semi intensive pond	180,2	81,6	0	0

Source: Pangkahwetan Village (2022)

DISCUSSION

The support function is one of the main functions in the market systems approach. The analysis is carried out to identify the various barriers that exist in the market system related to the support functions or services that support the exchange by focusing on the main causes and potential drivers for sustainability and the emergence of large-scale impacts. Supporting functions in this study include hatchery units, feed sales, financial services, technological services, sales and marketing, market information, and village-owned enterprises (BUMDes).

Hatchery Unit

The yield of milkfish cultivation highly depends on the distribution of the seeds which are directly related to the supply of *nener* (milkfish seeds). There are seven main activities in increasing pond production, known as the Sapta Usaha Budidaya Tambak (Nurjannah, 2009), including (1) pond construction; (2) water regulation; (3) tillage, fertilizing, and providing additional food; (4) pest eradication; (5) seed dispersal; (6) marketing of results; and (7) business management. Milkfish seeds are known as *nener*. Cultivators at Kampong Bandeng, Sumber Suci Sub-village, grow not only *nener* but also milkfish seeds called *gelondongan*.

Nener comes naturally from the milkfish spawning in the sea. However, this kinds of *nener* is not available throughout the year. In order to undertake intensive rearing, *nener* from the hatchery is needed. *Nener* is supplied from various regions such as from Situbondo, Lamongan, and Bali. From the results of the questionnaire, fifty-three percent or the majority of farmers cultivates *nener* coming from non-certified hatcheries. This means that the supply of *nener* has various qualities. Good quality will speed up the fish growth and vice versa.

Nener quality will affect the yield and quality of milkfish production. Excellent quality of *nener* will grow into high-quality milkfish. So, the source of nener supply becomes very important to increase production, meaning that the increase in production depends on the availability of *nener* both in quality and quantity. In addition, the quality of *nener* more or less will affect the prevention of pest or disease attacks. The success of seed production in the hatchery intensification and extensification allows a continuous supply of *nener* throughout the year so that rearing fish seed in the pond can be carried out optimally. Selection of healthy *nener* is an initial preventive step that must be done in anticipating production failures. Efforts to produce quality (superior) seeds can be achieved through parent selection, recovery, and genetic engineering approaches (Hutabarat, 2001).

Feed

Maintenance is activities carried out by the cultivators after stocking the seeds into the pond until harvesting time. Maintenance activities include (1) water quality control; (2) supplementary fertilization; (3) supplementary feeding (semi-intensive); (4) artificial feeding (intensive); (5) secondary pest eradication; and (6) follow-up liming (Mujiman in Yusuf, 2007). The food that the fish eat comes from nature (called natural food) and from man-made (called artificial feed). The system and technology used by the majority of farmers are traditional (two-thirds of the total farmers) and some are semi-intensive. The purpose of using artificial feed is to accelerate the growth of milkfish so that the time required for cultivation is shorter than the traditional one. Although it is able to accelerate the growth of milkfish, not all farmers switch to semi-intensive cultivation, because the use of artificial feed requires a relatively high cost.

Aside from the expensive and unstable price of feed, the need for feed is also relatively big in quantity. Limited capital makes some cultivators maintain traditional cultivation systems by using natural food, namely *klekap* (algae) in the ponds. Cultivators stimulate the growth of natural feed by providing fertilizer and the use of vitamins in the midst of milkfish growth. Although it takes a longer time with a lower productivity level, farmers prefer to keep applying traditional cultivation due to limited capital. The supply of seeds, feed, production, and disease control are all considered technical aspects of marketing (Lainawa et al., 2022). This indicates that, in addition to seed choice and production methods, feed usage plays a significant role in sales. A well-balanced and high-quality can enhance both illness resistance and productivity. In addition, the quality of the meat generated by milkfish can be enhanced by feeding them the proper feed. As a result, optimizing feed is essential to raising milkfish pond output.

Technology

The purpose of the milkfish growing business is to achieve high production, quality, and profit by paying attention to the aspects of business and resource sustainability. To increase the pond result and productivity, intensification and extensification patterns are applied. Intensification is an increase in production without adding production factors but based on the capabilities of existing production factors, for example: improving pond management by using superior seeds, regular irrigation, and improving technology.

Whereas, extensification is an increase in production by adding production factors, such as labor and capital for land and equipment.

In general, the level of aquaculture technology is divided into three, namely extensive/traditional, semi-intensive, and intensive. The results of the questionnaire shows that major cultivators apply traditional cultivation systems and only small numbers use semi-intensive cultivation systems. Cultivation land in Kampong Bandeng of Sumber Suci Sub-village is 202 ha for traditional cultivation containing 50 plots, while semi-intensive cultivation is 76 ha containing 15 plots.

Semi-intensive technology provides a higher level of productivity and is more profitable but traditional technology is more efficient. This condition makes milkfish cultivation with traditional technology still survive (Ula & Kusnadi, 2017). The right pattern of cultivation business and technology is expected to help increase production and optimize land use. The ability to use technology in the agricultural sector can assist agricultural activities that boost output and enhance farmer welfare in a very significant way (Ernawatiningsih et al., 2023). Adoption of technology also gives farmers new opportunities in terms of controlling milkfish growth through management of feed supplies, keeping on milkfish health to detect and treat diseases early, and product marketing to gain access to international markets and form alliances with suppliers and buyers via online platforms. This suggests that implementing technology can enhance farmers' long-term welfare in addition to raising productivity levels.

Finance

Capital can be obtained from two sources, i.e. owned capital and borrowed capital. Capital support, both investment in fishpond facilities and production facilities, is managed by cultivators which can be obtained either through bank credit or through owned capital. However, the majority of cultivators use their own capital. Only a few keep records of financial transactions (bookkeeping) so that cash flow control is relatively low. Based on the results of the questionnaire and interview, the majority of cultivators stated that there are no cooperatives or village-owned enterprises in the context of providing capital through a loan scheme.

Financial reports are very helpful for farmers to evaluate milkfish production results. When they get profit, it can be used as additional capital, and if they get loss, it can be used as evaluation for further production improvements. Through group activities, cultivators are directed to make financial reports of cultivation activities. These financial statements will provide an overview of whether the condition of the cultivators has increased or decreased (Jamal et al., 2018). Furthermore, to expand their business, cultivators who get improvement in their cultivation are directed to access capital from formal financial institutions. Beside being able to help in accessing capital, formal financial institutions can also collaborate with the government in providing financial training in order to strengthen farmers' ability to manage finances and increase productivity.

Market Information

Pokdakan or fish cultivator groups are groups of fish cultivators that are formed and grow on the basis of common interest. With the *pokdakan*, it is hoped that it will facilitate the transfer of cultivation information and technology. The function of the group is as a means of exchanging ideas and experiences to solve the problems found. Although the *pokdakan* has been formed, the majority of cultivators stated that the role of the *pokdakan* does not yet exist. The limited access to information on cultivation and technology is also due to the limited scope of research and the role of relevant institutions in providing market data and technology training.

Groups allow farmers to act as intermediaries to access various information, such as the distribution of subsidized fertilizer, agricultural technology counseling, subsidized agricultural credit and other programs distributed through farmer groups (Gapoktan) (Ernawatiningsih et al., 2023). Like Gapoktan, Pokdakan also has the same role as an intermediary for milkfish farmers in obtaining various information with the aim of increasing the ability of farmers to manage fisheries resources. Through collaboration with the government and the private sector, Pokdakan can play a significant role in improving the welfare of local communities and achieving sustainable development.

Sales And Marketing

Increased cultivation activities can be stimulated through understanding and applying technology at the stages of production, processing, and marketing. The harvesting process in the milkfish cultivation business at the Kampong Bandeng in Sumber Suci Sub-village is carried out twice to three times in a year. Then, the cultivators sell milkfish to retailers and collectors who are their customers from the Gresik, Lamongan, Malang, Bandung, Jakarta, and other areas. Buying and selling is done by telephone and the price is determined by mutual agreement in accordance with existing demand and stock. That is, the determination of prices is entirely on the market mechanism.

The factors that influence the success of the aquaculture business are increasing production to the maximum extent, optimizing the selling price of aquaculture products, and minimizing production and marketing costs (Hasan, 2009). The majority of cultivators stated that they did not use digital marketing media in the sales process. Buyers directly contact via telephone during harvest and price determination based on the results of negotiations or bargaining. The marketing concept is founded on the marketing management philosophy, which holds that satisfying customers and identifying the demands and preferences of the target market are essential to producer successes (Lainawa et al., 2022). This marketing management philosophy places customers at the center of all marketing activities. By focusing on customer satisfaction, can build strong long-term relationships with customers, increasing loyalty. Understanding and responding to changes in customer needs and desires also allows to remain relevant and competitive in an ever-changing marketplace.

Village-Owned Enterprises (BUMDes)

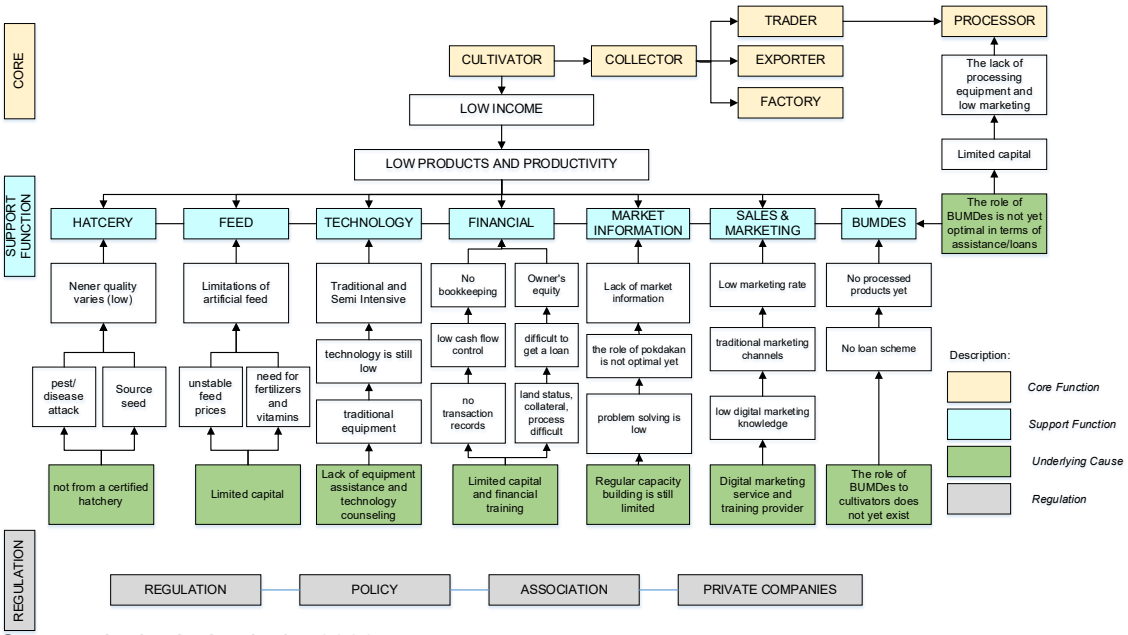
Adequate competence coupled with increasing the capacity of cultivators carried out on a regular basis will be able to have a positive correlation with the success of the cultivation carried out. Government involvement and synergy between government agencies in collaboration with stakeholders and fish farming communities are needed. The majority of cultivators stated that there was no role for BUMDes, either in assistance through increasing the capacity of cultivators or in funding through loan schemes. The role of BUMDes is at least through several activities such as implementing a reliable and integrated aquaculture data and information system and increasing the capacity of human resources for aquaculture actors. Policies and implementation of aquaculture business are the result of the planning process by policy makers. Good governance is the basis for successful aquaculture development policies to be formulated and implemented (Brugere et al., 2010).

Strengthening farmer institutions and cooperatives to increase production and marketing (Lainawa et al., 2020). Strengthening institutions such as the role of BUMDes makes it possible to increase production and marketing by milkfish farmers. This can be done in the form of involvement of BUMDEs through assistance or funding stimulus for several activities such as training and education programs for farmers regarding good milkfish farming practices and the latest technological innovations. BUMDes can become

marketing agents for farmers in increasing their access to local and wider markets. providing access to financial services such as business credit, savings, or agricultural insurance

Problem analysis seeks to determine the issues currently affecting the performance of the value chain or market system. The problem is in the support functions (services) that affect the core value chain. The problems that are often identified are symptoms of a wider systemic problem or underlying cause in the market. Therefore, in order to deliver results that will strengthen a sustainable market system, it is important to understand the causes of the issues before planning solutions. Based on the results of the underlying causes analysis, then analyzed further in order to understand the root of the problem and described in the matrix of internal and external factors. Internal analysis includes an assessment of strengths and weaknesses. External analysis includes opportunities (Opportunity) and challenges (Threat).

Figure 4. Analysis of the Underlying Causes



Source: Author's Analysis, 2022

After knowing the indicators of internal and external factors from the sector being analyzed, they can then be analyzed through a SWOT analysis to find out the basic strategies for solving problems that can be applied. First, the Strength-Opportunity (S-O) strategy includes increasing the accessibility of capital to financial institutions for the need for artificial feed in supporting the milkfish enlargement process; and increasing the role of related institutions in increasing the use of technology, for example through assistance to cultivators. Second, the Strength-Threat (S-T) strategy includes government intervention, especially in the price of artificial feed to make it more affordable and research and development through research collaboration between the government and academics in making probiotic feed as a more affordable alternative to artificial feed. Third, the Weakness-Opportunity (W-O) strategy includes selecting seeds from certified hatchery units and good stocking techniques; optimizing the use of balanced artificial feed and natural feed in order to reduce costs; and increasing the use of digitalization in the marketing process so that the target market is wider. Fourth, the Weakness-Threat (W-T) strategy includes, among others, organizing training on financial reports in controlling cash flow; and efforts to lead to modern management with intensive cultivation systems.

CONCLUSION

The milkfish cultivation business is the flagship at Kampong Bandeng, Sumber Suci Sub-village, Pangkahwetan Village, Ujungpangkah District, Gresik Regency. The productivity of milkfish cultivation is influenced by the optimization of supporting functions. It was found that the cause of the low productivity of milkfish cultivation was due to limitations in supporting services, not in the actors. The basic causes of this productivity include various seed quality, limited artificial feed, low utilization of technology, low access to capital, low marketing levels, and the minimal role of related institutions. Thus, systemic intervention is needed in these supporting services in order to improve the welfare of the community which in turn will increase the income of cultivators. For example, the government's role in providing/controlling the price of artificial feed so that it is more affordable for farmers, accessibility of capital to financial institutions, and optimizing the use of cultivation technology. Interventions in supporting functions such as hatchery units, feed sales, financial services, technological services, sales and marketing, market information, and village-owned enterprises (BUMDes) are expected to increase the productivity of milkfish farmers in the future.

ACKNOWLEDGEMENT

This journal article was written based on the results of research Mapping Pattern Analysis of the Potential Market System for Milkfish Cultivation in Pangkah Wetan Gresik Village which was funded by the Faculty of Economics and Business Universitas Brawijaya. The contents are fully the responsibility of the author.

DECLARATION OF CONFLICTING INTERESTS

The author declares that the published data in the manuscript does not have a conflict of interest against any parties. If later this is found, the full responsibility for this matter lies with the author.

REFERENCES

Aziz, N. (2013). *Strategi Peningkatan Kontribusi Perikanan Terhadap Pertumbuhan Wilayah Kabupaten Mamuju [Strategy to Increase the Contribution of Fisheries to Regional Growth in Mamuju Regency]* [Master's thesis, Hasanuddin University]. Repository UNHAS. http://repository.unhas.ac.id/10298/3/nasyrahazi-2682-1-13-nasyr-4.pdf

BEAM Exchange, SDC, and DFID. (2015). *The Operational Guide for the Making Markets Work for the Poor (M4P) Approach* (2nd ed.). https://www.enterprise-development.org/wp-content/uploads/m4pguide2015.pdf

Brugere, C., Ridler, N., Haylor, G., & Macfadyen, G. (2010). Aquaculture planning: Policy formulation and implementation for sustainable development. *FAO Fisheries and Aquaculture Technical Paper,* (542). http://dx.doi.org/10.13140/RG.2.1.1645.4007

Budiyanto, T. (2014). Analisis efisiensi saluran pemasaran ikan bandeng Desa Tambak Sari, Kecamatan Tirtajaya, Kabupaten Karawang [Analysis of milkfish marketing channel efficiency in Tambak Sari Village, Tirtajaya District, Karawang Regency]. *Agribusiness Journal, 8*(1), 83-110. https://doi.org/10.15408/aj.v8i1.5131

Central Agency of Statistics (BPS). (2020, December 31). *Statistik Perikanan dan Peternakan Kabupaten Gresik 2020 [Gresik Regency Fisheries and Livestock Statistics 2020]*. Badan Pusat Statistik. https://gresikkab.bps.go.id/publication/2021/12/31/96f9c273c967d9ce8db53533/statistik-perikanan-dan-peternakan-kabupaten-gresik-2020.html

Central Agency of Statistics (BPS). (2021, November 30). *Statistik Sumber Daya Laut dan Pesisir Tahun 2021 [Marine and Coastal Resources Statistics for 2021].*

Badan Pusat Statistik. https://www.bps.go.id/id/publication/2021/11/30/9689f74493b46bfcf97e8c92/statistik-sumber-daya-laut-dan-pesisir-2021.html

Central Agency of Statistics (BPS). (2022, Februari 25). *Kabupaten Gresik Dalam Angka 2022 [Gresik Regency in Figures 2022].* Badan Pusat Statistik. https://gresikkab.bps.go.id/publication/2022/02/25/6346c2c54a02fc7400f75d92/kabupaten-gresik-dalam-angka-2022.html

Ernawatiningsih, N. P. L., Budhi, M. K. S., Marhaeni, A. A. I. N., & Yuliarmi, N. N. (2023). Improving farmers' welfare by enhancing the ability of information technology adoption. *Journal of the Community Development in Asia, 6*(1), 100-109. https://doi.org/10.32535/jcda.v6i1.2067

Gresik Regency. (2021). *Peraturan Bupati Nomor 24 Tahun 2020 Tentang Rencana Kerja Pembangunan Daerah Kabupaten Gresik 2021 [Regent Regulation Number 24 of 2020 concerning the 2021 Gresik Regency Regional Development Work Plan].* Pemerintahan Kabupaten Gresik. https://gresikkab.go.id/documents/1618368661-1-dikonversi%20(1)-digabungkan.pdf

Haeruman, H. (2005). *Kemitraan Dalam Pengembangan Ekonomi Lokal [Partnership in Local Economic Development]*. Yayasan Mitra Pembangunan Desa-Kota dan BIC-Indonesia.

Hasan, B. (2009). *Peranan Teknologi Pengolahan Hasil Perikanan Dalam Pengembangan Industri Perikanan di Indonesia [The Role of Fishery Product Processing Technology in the Development of the Fisheries Industry in Indonesia]* [Inauguration of Professor speech, University of Riau]. Repository UNRI. https://repository.unri.ac.id/handle/123456789/469

Hikmayani, Y., & Putri, H. M. (2014). Strategi Pengembangan Pasar Bandeng (Chanos-chanos sp) [Milkfish Market Development Strategy (Chanos-chanos sp)]. *Jurnal Kebijakan Sosial Ekonomi Kelautan dan Perikanan, 4*(1), 93-104.

Indonesia. Minister of Marine Affairs and Fisheries (KKP RI). (2020). *Laporan Kinerja Direktorat Jenderal Perikanan Budidaya Tahun 2020 [Performance Report of the Directorate General of Aquaculture for 2020].* KKP RI. https://kkp.go.id/djpb/page/2461-laporan-kinerja-djpb

Indonesia. The Audit Board (BPK RI). (2009). *Undang-undang (UU) Nomor 45 Tahun 2009 tentang Perubahan Atas Undang-Undang Nomor 31 Tahun 2004 Tentang Perikanan [Law (UU) Number 45 of 2009 concerning Amendments to Law Number 31 of 2004 concerning Fisheries]*. Peraturan BPK. https://peraturan.bpk.go.id/Details/38790/uu-no-45-tahun-2009

Indonesia. The Audit Board (BPK RI). (2013). *Peraturan Menteri Kelautan dan Perikanan Nomor 35/PERMEN-KP/2013 Tahun 2013 tentang Tata Cara Penetapan Status Perlindungan Jenis Ikan [Regulation of the Minister of Maritime Affairs and Fisheries Number 35/PERMEN-KP/2013 of 2013 concerning Procedures for Determining the Protection Status of Fish Species]*. Peraturan BPK. https://peraturan.bpk.go.id/Details/158291/permen-kkp-no-35permen-kp2013-tahun-2013

Indonesia. The Audit Board (BPK RI). (2014). *Undang-undang (UU) Nomor 6 Tahun 2014 tentang Desa [Law (UU) Number 6 of 2014 concerning Villages]*. Peraturan BPK. https://peraturan.bpk.go.id/Details/38582/uu-no-6-tahun-2014#:~:text=Undang%2DUndang%20ini%20menegaskan%20bahwa,Indonesia%2C%20dan%20Bhinneka%20Tunggal%20Ika.

Jamal, M., Muhibuddin, A., & Indrawati, E. (2018). Identifikasi potensi dan strategi pengembangan budidaya ikan bandeng (chanos chanos forskall) di Desa Panaikang Kecamatan Sinjai Timur Kabupaten Sinjai [Identify potential and strategies for developing milkfish cultivation (chanos chanos forskall) in

Panaikang Village, East Sinjai District, Sinjai Regency]. *Journal of Aquac. Environment, 1*(1), 8-14.

Lainawa, J., Lumy, T. F. D., & Kalangi, J. K. (2022). Analysis of strategic management for local layer agribusiness development in north Sulawesi. *International Journal of Applied Business and International Management, 7*(1), 106-123. https://doi.org/10.32535/ijabim.v7i1.1445

Lainawa, J., Rawis, J. E., & Rembang, V. L. (2020). Analysis of dairy farm management strategy development in North Sulawesi. *International Journal of Applied Business and International Management, 5*(2), 1-12. https://doi.org/10.32535/ijabim.v5i2.853

Nurjannah, N. (2009). *Analisis Prospek Budidaya Tambak di Kabupaten Brebes [Analysis of Pond Cultivation Prospects in Brebes Regency]* [Master's thesis, Diponegoro University). Institutional Repository (UNDIP-IR). http://eprints.undip.ac.id/19610/

Pangkahwetan Village. (2022). *Profiling Kampung Bandeng Desa Pangkahwetan Tahun 2022 [Profiling of the Milkfish Village of Pangkahwetan Village in 2022]* [Unpublished presentation slides].

Ula, M., & Kusnadi, N. (2017). Analisis usaha budidaya tambak bandeng pada teknologi tradisional dan semi-intensif di Kabupaten Karawang [Analysis of milkfish pond cultivation businesses using traditional and semi-intensive technology in Karawang Regency]. *Forum Agribisnis, 7*(1), 49-66). https://doi.org/10.29244/fagb.7.1.49-66

Winarsih, W. H., Rahardjo, T., & Husein, A. (2011). *Budi Daya dan Pengolahan Bandeng [Milkfish Cultivation and Processing]*. Airlangga University Press.

Yusuf, D. (2007). *Analisis Sosial Ekonomi Usaha Pembesaran Ikan Bandeng di Kecamatan Tanete Riattang Timur Kabupaten Bone [Socioeconomic Analysis of Milkfish Farming Business in East Tanete Riattang District, Bone Regency]* [Master's thesis, Hasanuddin University]. Repository UNHAS. http://repository.unhas.ac.id/id/eprint/7224/