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Feasibility Analysis of Tilapia Farming in the Maju Bersama Fisheries Group, Central Papua Province

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Abstract

This study aims to determine the feasibility level of tilapia farming undertaken by the Maju Bersama Fisheries Group in Bomomani Village, Mapia District, Dogiyai Regency, Central Papua Province. The research method employed is a survey approach, using questionnaires and interviews with respondents, namely fish farmers engaged in tilapia farming. This study was conducted over one month, from October to November 2024. The respondents of the study were members of the Maju Bersama Fisheries Group in Bomomani Village, Mapia District, Dogiyai Regency, Central Papua Province. The results show that the fixed costs incurred for cultivating 6,000 tilapia in earthen ponds over one production cycle amount to IDR 10,200,000, variable costs to IDR 10,200,000, and total costs to IDR 37,300,000. Revenue reaches IDR 64,275,000, resulting in a profit of IDR 26,975,000. The Cost Ratio is 1.7, indicating that the tilapia farming business is efficient, as evidenced by an R/C ratio value greater than 1.

Keywords: Business Feasibility, Cultivation, Tilapia

Introduction

Indonesia is one of the countries with significant potential in the aquaculture sector, making it one of the world's leading producers (Almaududi, 2024). The contribution of this sector is crucial to the national economy, particularly in supporting the welfare of local communities. According to the Ministry of Marine Affairs and Fisheries, aquaculture significantly contributes to the fisheries sector's gross domestic product (GDP). To ensure the success of aquaculture enterprises, an effective management system is required—one that can produce high-quality products while supporting business climate stability. Law of the Republic of Indonesia governs this management Number 45 of 2009 Article 6 Paragraph 1, which emphasizes that fisheries management must focus on optimal and sustainable benefits while ensuring the preservation of fishery resources (Prayuda et al., 2019).

One of the aquaculture fish species with promising prospects is tilapia *(Oreochromis niloticus)* (Daud et al., 2024). This fish is known for its fast growth, resistance to diseases, and adaptability to various rearing systems, such as floating net cages, ponds, and even rice fields (Hastuti & Subandiyono, 2021). These advantages make tilapia a leading commodity in Indonesia's aquaculture sector (Hadie et al., 2018). Moreover, tilapia is an omnivorous fish, making it adaptable to various types of feed, including household waste, which makes its farming more economical and easier to manage (Burhanuddin et al., 2022). According to data from the Central Statistics Agency (BPS, 2023), tilapia production in Indonesia has increased by an average of 6% annually over the past five years, indicating a promising business opportunity.

Bomomani Village, Mapia District, Dogiyai Regency, Central Papua, has great potential for developing tilapia farming. The availability of vast agricultural land and abundant water sources provides significant opportunities to enhance the local economy through business diversification, including inland fisheries (Mardhia et al., 2020). Most of the residents in Bomomani Village work in the agricultural sector, which is still managed traditionally. With improved management, the potential for inland fisheries in the village can be developed to support a sustainable local economy.

A feasibility analysis is necessary to ensure the sustainability of tilapia farming. Financial feasibility is crucial, particularly in determining whether the business can generate adequate profits and meet its financial obligations (Suwarno, 2020). According to Bate'e et al. (2024), business feasibility analysis helps farmers make strategic decisions that support business sustainability. This is important not only for existing entrepreneurs but also for those who are just starting their ventures.

Based on these potentials and challenges, this study aims to assess the feasibility of tilapia farming by the Maju Bersama Fisheries Group in Bomomani Village, Mapia District, Dogiyai Regency, Central Papua Province. This research is expected to provide a comprehensive overview of the prospects and sustainability of tilapia farming in the region.

Literature Review

Tilapia Fish Cultivation Concept

Tilapia farming *(Oreochromis niloticus)* has become one of Indonesia's main activities in aquaculture. The core concepts of this farming include selecting high-quality fry, feed management, maintaining water quality, and managing the pond's surrounding environment (Sehani et al., 2024). Tilapia is known for its high adaptability to various environments and farming systems, ranging from earthen ponds to floating net cages, making it one of the leading commodities in aquaculture (Adi et al., 2021). Factors such as feed efficiency, rapid growth, and tolerance to suboptimal environmental conditions make tilapia a top choice for fish farmers.

Economic Potential of Tilapia Cultivation

The economic potential of tilapia farming is substantial, particularly in supporting rural household incomes. A study by Damayanti et al. (2024) revealed that tilapia farming significantly contributes to increasing household income, especially in rural areas with abundant water resources. Furthermore, financial analysis indicates that this business has a high return on investment if managed effectively. Aeni (2023) emphasized that tilapia farming can become a sustainable source of income when supported by adequate access to technology and markets.

Feasibility of Fisheries Cultivation Business

Feasibility analysis is a crucial step in determining the sustainability and profitability of aquaculture businesses. The study by Purnamasari & Hendrawan (2013) indicates that feasibility analysis encompasses not only financial aspects but also technical, social, and environmental factors. In the context of tilapia farming, business feasibility can be assessed through parameters such as the Benefit-Cost Ratio (BCR), Return on Investment (ROI), and Payback Period. This research is relevant as it provides insights for farmers to understand their business's risks and potential benefits.

Research Method

This study was conducted over one month, from October to November 2024, at the Maju Bersama Fisheries Group located in Bomomani Village, Mapia District, Dogiyai Regency, Central Papua Province.

This study employed a descriptive quantitative method. Descriptive methods are considered problem-solving procedures that analyze the conditions of research objects (individuals, institutions, communities, and others) based on existing facts (Hadari Nawawi, 2011). Meanwhile, according to Suharsimmi (2020), quantitative research is a method of collecting, interpreting, and presenting data. This research was conducted through a survey by distributing questionnaires and conducting interviews with respondents, namely fish farmers engaged in tilapia farming.

A. Cost Analysis

The cost analysis in this study was used to examine the expenses incurred, the revenue generated, and the profits earned from the business operations. The cost analysis methods include:

1. Cost
   Yudha et al. (2022) explained that costs can be systematically calculated using the following formula:
   TC = TFC + TVC……(1)
   Information:
   TC = Total cost (Rp/Year)
   TFC = Total Fixed Cost/Depreciation (Rp/Year)

TVC = Total Variable Costs (Rp/Year)

2. Revenue

   Explained that the revenue from production output can be determined using the following formula :

   TR = Q x P…….(2)

   Information:

   TR (Total Revenue) = Total revenue (Rp/Year)

   Q (Quantity) = Tilapia production results (Rp/Year)

   P (Price) = Selling Price of Production Results (Rp/Year)

3. Income

   Yudha et al. (2022) stated that profit can be calculated mathematically using the following formula:

   π = TR – TC…….(3)

   Information:

   π = Profit (Rp/Year)

   TR = Total Revenue (Rp/Year)

   TC = Total Cost (Rp/Year)

B. Business Feasibility Analysis

Revenue Cost Ratio (RCR), as explained by Ambara et al. (2023), can be used to determine whether tilapia farming *(Oreochromis niloticus)* is profitable or not using the following formula:

RCR = TR/TC ……..…(4)

Information:

RCR (Revenue Cost Ratio) = Ratio of costs and revenues

TR (Total Revenue) = Total revenue (Per/Year)

TC (Total Cost) = Total cost (Rp/Year)

If;

RCR >1 then the business is profitable

RCR <1 then the business is not profitable

RCR = 1 then the business is neither profitable nor at a loss

Result

The study aims to analyze the feasibility of tilapia farming conducted by the Maju Bersama Fisheries Group in Bomomani Village, Mapia District, Dogiyai Regency, Central Papua Province. The research focuses on calculating costs, revenue, profits, and business efficiency through an analysis of the R/C Ratio.

Cost and Revenue Analysis

Fixed costs include expenditures on equipment that is not consumed within a single harvest cycle. These expenses cover supporting tools such as machetes, shovels, nets, and water pumps required to support aquaculture activities.

Table 1. Fixed Costs

No	Description	Volume	Unit	Unit Price (Rp)	Total Price (Rp)
1	Threshing Machine	1	Unit	3.500.000	3.500.000
2	Crowbar	5	Unit	50.000	250.000
3	Shovel	5	Unit	150.000	750.000
4	Dipper	5	Unit	10.000	50.000
5	Meter	2	Unit	50.000	100.000
6	Cart	1	Unit	1.000.000	1.000.000
7	Net	4	Unit	200.000	800.000
8	Machete	5	Unit	100.000	500.000
9	Bucket	5	Unit	50.000	250.000
10	¾ dim PVC pipe	6	Unit	100.000	600.000
12	¾ dim hose	2	Roll	500.000	1.000.000
13	2 Inch 4 Kw 380V Water Pump	1	Packet	450.000	450.000
14	Rope	4	Roll	100.000	400.000
15	Scale	1	Unit	150.000	150.000
16	Transportation	1	Unit	400.000	400.000
		Total			**10.200.000**

Source: Processed Secondary Data (2024)

Based on Table 1, it is evident that the fixed costs incurred by the Maju Bersama Fisheries Group in Bomomani Village, Central Papua Province, during a single tilapia farming cycle amount to IDR 10,200,000.

Table 2. Variable Cost

No	Description	Volume	Unit	Unit Price (Rp)	Total Price (Rp)
1	Tilapia Fish Seedlings	6.000	Tail	2.000	12.000.000
2	Tilapia Fish Feed	26	Bag	500.000	13.000.000
3	Water Probiotics	10	Liter	50.000	500.000
4	Feed Probiotics	10	Liter	50.000	500.000
5	Raffia Rope	2	Roll	50.000	100.000
6	Transportation				1.000.000
		Total			**27.100.000**

Source: Processed Secondary Data (2024)

Table 2 shows that the average variable costs incurred by fish farmers in Bomomani Village amount to IDR 27,100,000. The largest portion of variable costs is spent on the procurement of production inputs, particularly fish feed, which accounts for IDR 13,000,000. This is because fish feed is the most critical component in tilapia farming, and its price is relatively high. The total cost of red tilapia farming is the sum of all fixed and variable costs incurred during farming.

Table 3. Total Cost

No	Description	Amount
1	Fix Cost	10.200.000
2	Variable Cost	27.100.000
	Total	**37.300.000**

Source: Processed Secondary Data (2024)

Based on the table, it can be observed that the total cost for a single cycle of tilapia farming is IDR 37,300,000. The largest expense in red tilapia farming comes from variable costs, amounting to IDR 27,100,000, while fixed costs account for IDR 10,200,000 of the total cost.

Table 4. Total Revenue

No	Production Results	Weight (Kg)	Price per Kg (Rp))	Receipt
1	Tilapia	857	75.000	64.275.000
		Amount Rp		**64.275.000**

Source: Processed Secondary Data (2024)

Table 4 shows that the average production of red tilapia in a single farming cycle in ponds is 875 kilograms, sold at a price of IDR 75,000/kg. The revenue earned by the Maju Bersama Fisheries Group tilapia farmers is IDR 64,275,000. This revenue is generated from the sale of tilapia during one farming cycle.

Profit and Financial Analysis

Table 5. Benefits

No	Description	Total (Rp)
1	Receipts	64.275.000
2	Total cost	**37.300.000**
	Profit	**26.975.000**

Source: Processed Secondary Data (2024)

Table 5 shows that the revenue from tilapia farming is IDR 64,275,000, with total costs incurred amounting to IDR 37,300,000. Thus, the average profit earned by each farmer in the Maju Bersama Fisheries Group in Bomomani Village, Central Papua, is IDR 26,975,000.

Table 6. Cost Ratio

No	Description	Total (Rp)
1	Reception	64.275.000
2	Total Cost	37.300.000
	Total	**1.7**

Source: Processed Secondary Data (2024)

Table 6 indicates that the efficiency of tilapia farming is 1.7. This means that the farming operation is efficient, as shown by an R/C ratio greater than one. The R/C ratio reflects the gross income received for every rupiah spent on the farming process. An R/C ratio of 1.7

means that for every IDR 1.00 spent during the red tilapia farming process, a return of 1.7 times the cost incurred is achieved.

Break Event Point (BEP)

The Break-Even Point (BEP) is a parameter used to determine the point at which a business breaks even (Rahmi et al., 2023). The break-even point of production is referred to as BEP (Units), while the break-even point of sales is referred to as BEP (Price). The following is the BEP calculation based on assumptions:

$$\text{BEP (Unit)} = \frac{Fixed\ costs}{Price\ per\ unit - (\frac{Variable\ costs}{Quantity\ of\ production})}$$

$$= \frac{10.200.000}{75.000 - (\frac{27.100.000}{857})}$$

= 235 unit

$$\text{BEP (harga)} = \frac{Fixed\ costs}{1 - (\frac{Variable\ costs}{Revenue})}$$

$$= \frac{10.200.000}{1 - (\frac{27.100.000}{64.275.000})}$$

= Rp. 17.586.207

Discussion

The research results indicate that tilapia farming by the Maju Bersama Fisheries Group in Bomomani Village, Central Papua, is financially feasible and efficient. This finding is supported by various parameters, including cost analysis, revenue, profit, and business efficiency, measured through the R/C ratio and Break-Even Point (BEP).

Cost and Revenue Analysis

The fixed costs of IDR 10,200,000 include expenditures on tools that are not consumed within a single production cycle. This finding aligns with aquaculture management theory, where fixed costs are typically allocated for acquiring production tools with longer economic lifespans (Umbase et al., 2022). Variable costs, which represent the main component in tilapia farming, amount to IDR 27,100,000. Most of these costs are spent on feed procurement, consistent with Styana et al. (2019), who stated that feed constitutes the largest component of operational costs in fish farming. With total costs of IDR 37,300,000 and revenue of IDR 64,275,000, the profit achieved is IDR 26,975,000. This identifies tilapia farming as a venture providing a good rate of return. These profits are consistent with research by Mahfudiyanto & Herman (2023), which demonstrated that tilapia farming has high financial potential when managed effectively.

Business Efficiency

An R/C ratio of 1.7 indicates that this business is efficient, with every IDR 1.00 spent generating revenue of IDR 1.70. According to business efficiency theory, an R/C ratio greater than 1 demonstrates that the business is profitable and viable to continue (Hajar et al., 2019). This finding aligns with the study by Setiadi et al. (2018), which confirmed that tilapia farming has a high profit potential if operational cost efficiency is maintained. The BEP calculation shows that the production break-even point is 235 kg, while the price break-even point is IDR 17,586,207. This means the business will begin generating profits once production exceeds 235 kg or revenue surpasses IDR 17,586,207. These parameters support the business's feasibility, as the average production output of 857 kg per cycle far exceeds the BEP. The study by Ratnasari et al. (2021) also highlighted that tilapia farming businesses can surpass the break-even point, demonstrating strong potential for sustainability.

Conclusions

This study demonstrates that tilapia farming by the Maju Bersama Fisheries Group in Bomomani Village is financially viable and efficient. With total costs of IDR 37,300,000, revenue of IDR 64,275,000, and a net profit of IDR 26,975,000, the business achieves an R/C ratio of 1.7, indicating good efficiency and profit potential. The Break-Even Point (BEP) reveals a production threshold of 235 kg and a price threshold of IDR 17,586,207, indicating that the business has surpassed the sustainability threshold. The study's limitations include a narrow geographical scope and data confined to a single production cycle. Future research should cover a broader area, examine socio-economic and environmental aspects, and develop innovative strategies to reduce production costs. This would optimize and sustain the business, further supporting the local economy

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