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Analysis of Tilapia (*Oreochromis Niloticus*) Biofloc System Cultivation Business in the Minabe Agribusiness Group of Cikaret

[1] Gusti Aries, [2] Sobariah, [3] Asnawi, [4] Ganjar Wiryati, [5] Iis Jubaedah

[1,2,3,4,5] Polytechnic of Fisheries Business Experts Jakarta, Indonesia

Email: sobariah.nafis@gmail.com

KEY W O R D S

Business Analysis, Biofloc, Nile Tilapia Farming

A B S T R A C T

This study aims to analyze the Nile tilapia (Oreochromis niloticus) farming business using the biofloc system in the Minabe Agribusiness group, located in Cikaret Village, south Bogor District. The research was conducted in October-November 2023 through direct interviews. The biofloc system was chosen to optimize feed utilization and maintain water quality. A financial analysis was carried out to evaluate the feasibility of the business by considering fixed costs, variable costs, and investments. The main challenge faced by the group was the high mortality rate of seeds during the early stage of the farming cycle. This study shows that farming with the biofloc system has good prospects. Despite technical challenges, with improved water quality management, this business can increase productivity and profitability.

1. Introduction

Tilapia cultivation business (*Oreochromis niloticus*) is one of the fastest-growing freshwater aquaculture businesses in Indonesia. Tilapia has a good level of adaptation to the cultivation environment and high market demand, both in the local market and the international market (Avnimelech, 2009), along with the increasing cost of production and the need for good water quality, the biofloc system is one of the advantageous technological options in tilapia cultivation the biofloc system utilizes microorganisms to decompose organic waste in the water. which can eventually be used as additional nutrients for fish (Avnimelech, 2009). As according to (Stockhausen et al., 2024), the biofloc system can reduce the reduction of additional feed by up to 20% because the bacteria in the biofloc process the rest of the feed into an additional source of protein.

The Minabe Agribusiness Cikaret business group was founded in 2010 by Widia Muhtar, this group consists of 10 young people who focus on raising tilapia up to 4-5 per kilogram. Each cultivation cycle takes 2-3 months with an average production of 1800 heads per cycle. Despite having a stable market, this group faces challenges in the form of high seed mortality rates in the early phases of stocking. One of the obstacles that is often faced in the biofloc system is the high mortality rate in fish fry, especially in the early days of stocking, as identified by (Majhi et al., 2023).

The biofloc system is carried out to overcome these obstacles in the hope of improving feed efficiency and water quality (Boyd, 2000). Analyze the potential profits of tilapia farming business with the biofloc system in the Minabe Cikaret business group as well as the obstacles faced especially in the early phase of cultivation and evaluate the feasibility of the business through financial analysis based on fixed costs, variable costs and investments. The business activities of tilapia cultivation in the biofloc system are aligned with the idea of the Marine-based economy as defined by (Khanjani et al., 2023), that the principle of the Blue Economy involves utilizing resources in a way that ensures their sustainability over time in growing the economy, as well as livelihoods and petrifying to create jobs for the community by not damaging the environmental ecosystem so that the welfare of the community is guaranteed.

2. Methodology

This research employs a qualitative approach and quantitative descriptive approach with primary data obtained through direct interviews with the chairman of the Minabe Cikaret business group and field observations. Secondary data were collected from scientific journals and books related to the cultivation of tilapia in the biofloc system. The research was carried out from September-November 2023 at the Cikaret agribusiness minabe group, which is located in Cikaret Village, South Bogor District. The data collection methods used are direct surveys and questionnaires to obtain information related to production performance and economic aspects of tilapia farming business. The sampling process employed the purposive sampling technique, which is to select samples based on fishery groups that are fostered by fisheries extension workers in the region. The observed variables include:

1) Cost structure: fixed costs, variable costs and investments

2) Production cycle: length of production cycle, production quantity and constraint factors

3) Marketing: distribution channels and market demand.

In financial analysis, there are several financial indicators that are analyzed, including the R/C ratio is utilized to evaluate the profitability of the business. If the R/C value > 1, the business is considered profitable (Amir et al., 2023). BEP Unit, BEP Rupiah, Payback Period, and Return On Investmenet are as follows:

Ratio of revenue to costs	= Total revenue total cost	(1)
Break Even Point (BEP) Rupiah	= Fixed CostSelling price per unit-variable price per unit	(2)
Unit of Break-Even Point (BEP)	= Fixed Cost1 - Variable cost of total sales	(3)
Recovery Time (RT)	= Total investment profit per cycle x years	(4)
Investment Yield (IY)	= Total Return of Investment x 100%	(5)

3. Result and Discussion

Tilapia cultivation (*Oreochromis niloticus*) with a biofloc system has business prospects with significant profits of Rp. 30,225,139. With a bioflock system that can reduce the use of commercial feed by almost 20% and improve water quality, the obstacles are water quality management and high seed mortality are still the main issues. Around 40% of the Minabe Agribisnis Cikaret group has 40 ponds with a diameter of 4m and 10 units with a diameter of 6m, and has managed to produce around 21,000 tilapia per cycle from a stocking of 35,000 seeds measuring 8-10cm. Each cycle lasts for 2-3 months, with a fixed cost of Rp.10,674,861/month and a variable cost of Rp.141,000,000. The selling price of tilapia in the market reaches Rp26,000/kilogram, with a total production of around 7000 kilograms/cycle. With a price of Rp.26,000/Kg, the total revenue obtained reached Rp.182,000,000/cycle.

Financial analysis shows that with proper management, these ventures can break even after several production cycles. The investment cost of Rp.117,000,000, for facilities and equipment, such as tarpaulin ponds, warehouses, and blowers can be covered in several business cycles. The financial data in the Minabe Agribusiness Cikaret group, starting from investment data and brothel costs incurred during the production process as listed in Table 1 below:

Table 1. Investment of the Minabe Agribusiness Cikaret business group in 2023

Yes	Description	Sum	Unit	Unit Price (RP)	THU	Total Price (Rs)
1	Tarpaulin pool D6-21 aerator point	10	Unit	9.000.000	5 th	90.000.000
2	Fishing Gear	1	Unit	2.500.000	6 th	2.500.000
3	Super chapter AMT1500 Phase 3 HP	1	Unit	15.000.000	10 th	15.000.000
4	Water pump	1	Brassiere	1.500.000	10 a.m.	1.500.000
5	Generator Set	1	Unit	7.000.000	10 th	7.000.000
6	Sheher scales	1	Unit	1.500.000	10 th	1.500.000
		Sum				117.500.000

Source: primary data processed 2023

The production cost of the tilapia cultivation business of the Minabe Agribusiness Cikaret group is Rp. 151,774,861, with the prices in the Minabe Agribusiness Cikaret business group starting from Rp. 26,000, followed by Rp. 28,000, and Rp. 30,000, but in this research activity the focus is on the price of Rp. 26,000, then the results of the financial analysis carried out in this group are analyzed with financial analysis tools, namely the R/C ratio, BEP units, BEP Rupiah, Paaybac Period and Return on Investment, can be found in Table 2 below:

Table 2. Analysis of the Tilapia Cultivation Business of the Biofloc System in the Minabe Agribusiness Group Cikaret

Yes	Description	Unit	Sum
1.	Investment	Rp	117.500.000
2.	Production Costs	Rp	151 774.861
3	Production	Kg	7000
4.	Price	Rp/kg	26.000
5.	Advantage	Rp	30.225.1138
6	R/C Ratio	%	1.2
7	BEP urupiah	Rp	47.501.826
8	BEP unit	Kg	1.827
9	Paybac Period	Th/month	8,9
10	ROI	%	11.22

Source: primary data processed in 2023

Discussion and Analysis

The biofloc system has great potential in increasing the production efficiency of tilapia. This technology reduces reliance on commercial feed, which is the largest cost component in fish farming (Boyd, 2000). In addition, biofloc also plays a role in maintaining water quality, thereby minimizing the risk of seed death at the beginning of the cultivation cycle (Avnimelech, 2009). As stated in his research by (Karunaarachchi et al., 2017), that the biofloc system is a cultivation method that is increasingly famous and popular in the world of fisheries, because of its ability to improve feed efficiency and waste management, the application of biofloc in tilapia cultivation is able to increase fish growth and feed use efficiency by converting organic waste into additional nutrients for fish, reducing water pollution and strengthening the principle of "zero waste" in the Blue Economy. However, the main challenge faced by the Minabe Agribisnis Cikaret group is the high seed mortality rate. This is consistent with the study of (Das et al., 2021), as mentioned by poor water quality can lead to high mortality in fish fry. Better the condition of water management, including factors like pH and dissolved oxygen regulation, can reduce seed mortality rates (Stockhausen et al., 2024) explained that water quality management, including the use of probiotics is key in maintaining optimal conditions in biofloc ponds. Probiotics help stabilize microbial composition which reduces waste and maintains water quality. As stated by (Jamal et al., 2020), the biofloc system can reduce the use of additional feed by up to 20%, because the bacteria in the biofloc process the remains of feed into an additional source of protein. In addition, the use of probiotics can also help in improving fish health and water quality (Timmons & Ebeling, 2013) and (Jamal et al., 2020) emphasized that water quality management has a great influence on fish growth, especially in biofloc systems that require microbial balance to decompose organic remains, this is in accordance with and in line with the principles of Blue Economy (Pauli, 2010), supporting sustainable

resource management, In Bioflock, water can be recycled and reused, reducing new water consumption as well as environmental impact.

From an economic point of view, based on Table 2, this venture shows promising potential, especially with a stable market and controllable operational costs. Regarding the tilapia market and economic analysis, according to (Minarti & Mokodompit, 2025), it shows that the demand for tilapia in peri-urban areas remains high, and this cultivation business has great profit potential if it can minimize the risk of seed death, where if we look at the Blue Economy concept, it prioritizes economic activities that do not damage marine and aquatic ecosystems. Tilapia cultivation with a bioflock system supports environmentally friendly production because it reduces the need for land and resources that are usually used in conventional cultivation systems, as well as providing economic opportunities for local communities, supporting inclusivity and welfare, which is one of the fundamental aspects of the ocean-based economy (Silver et al., 2015).

The results of the analysis of the tilapia cultivation business in the Minabe Agribusiness group show that the business is very promising, and has the opportunity to continue to be developed, based on Table 2 that the tilapia cultivation business is analyzed by looking at the ratio, that the business obtains an R/C above 1 or more than 1 as stated in the research of (Sobariah et al., 2020) indicating that a R/C greater than 1 means the business is viable to run and develop, because the greater the ratio obtained, the more feasible it is to develop, as well as the break-even point obtained by the biofloc system cultivation business run by the Minabe Agribusiness Cikaret business group, the break-even point based on the unit obtained is 1,827 kg, where at this point the production carried out is breakeven, meaning that the business at that point does not suffer losses or does not make profits, namely the condition where between the costs incurred and The sales obtained are equal to zero (0) or where R = C, and at this point the business run by the Minabe Agribusiness group can be known the amount of production to be produced with a product limit of 1,827 kg, the business carried out is equal to the point of sale of Rp.47.501826,- this shows that the business that is run will be able to determine how much profit will be obtained and can also determine the selling price that will be applied in the cultivation business. And the point is that this BEP analysis can determine the level of profit at various levels of production. In addition to the break-even point analysis in this study, it is also sought by looking at the analysis of the principal return both from the time of return and also from the efficiency of the use of business capital. Based on the results of the principal return analysis, PP=8.9 months or about 2 to 3 cycles of capital spent in tilapia farming business with a biofloc system can return to this analysis to find out how the time required for cash flow generated by an investment activity covers all its initial costs (Amir et al., 2023), and the efficiency of capital use of around 11.22% is quite efficient, ROI shows that this business generates a significant return on investment, this aligns in accordance with the tenets of the Blue Economy. By optimizing the efficient utilization of water resources through biofloc systems, these efforts not only support environmental sustainability but also help enhance the quality of life for local communities, without sacrificing the surrounding ecosystems. If viewed from this analysis, the biofloc system cultivation business run by the Minabe Agribusiness group is a promising cultivation business and has great opportunities to continue to be developed.

4. Conclusion

This study examines the tilapia cultivation business within the Minabe Agribusiness business group, focusing on the application of the biofloc system. The analysis highlights several significant benefits of this system. First, the biofloc technology enhances tilapia productivity by utilizing microorganisms to recycle waste into additional nutrients, which reduces the need for external feed and lowers operational costs. Second, the system minimizes water usage and disposal, aligning with the Blue Economy principle that advocates for the sustainable

management of water resources. Furthermore, the biofloc system helps maintain water quality around the cultivation site, contributing to environmentally friendly practices and minimizing the environmental impact, which is essential for preserving aquatic ecosystems. Lastly, with increased efficiency and production, the Minabe Agribusiness group can boost its revenue, demonstrating that sustainable technologies like biofloc not only promote environmental protection but also support the economic well-being of local communities, in line with the Blue Economy's objective of fostering inclusive economic growth.

Recommendations

Further development in the application of biofloc technology is highly recommended to strengthen the fisheries sector's contribution to the Blue Economy. There is also a need for stronger training and policy support to support the adoption of this system on a wider scale.

Compensation

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