

PROFIT AND FEASIBILITY ANALYSIS OF TILAPIA CULTIVATION BUSINESS IN FLOATING NET CAGES, BARITO KUALA REGENCY

ABSTRACT

Cultivators also have problems, namely reduced profits each time they harvest compared to previous years. The aim of the study was to analyze the benefits and feasibility of cultivating tilapia in floating net cages in Barito Kuala Regency, South Kalimantan. This research was conducted in Marabahan District, City of Barito Kuala Regency, cultivating fish in floating net cages. The study used 2 respondents who were given floating net cage loan assistance from the government, but 1 respondent for feed and seeds came from their own funds. Tilapia aquaculture in floating net cages is said to be profitable if the revenue value is greater than the total expenditure. To analyze the feasibility of investing in floating net tilapia aquaculture in Barito Kuala district, calculations on investment criteria are used which include Net Present Value (NPV), Net Benefit Ratio (NBCR), and Internal Rate of Return (IRR). The results of the analysis of the calculation of profit (π) for tilapia cage business can be stated that the tilapia cage business of the two managers each generates profits in 3 (three) study periods, marked by the criteria $TR > TC$ where the total business revenue is greater than the total costs incurred. issued for production. The results of the financial feasibility analysis of tilapia cage business from 2 (two) managers stated that they had met the business feasibility criteria in 3 (three) study periods. This can be seen from the Net Present Value which has a positive value and the Internal Rate of Return which is greater than the required interest rate.

Keywords: *Tilapia, Floating Net Cage, Profit, Feasibility, Batola*

1. INTRODUCTION

The potential for public water resources which is quite extensive is an asset for the surrounding population, especially those who are interested in conducting freshwater fish farming in public waters such as reservoirs, lakes and ponds (Samadi, 2010). The process of fish growth, both length and weight, is the type of feed that is suitable, dosage, additional vitamins, and the right feeding time and stocking density which is adjusted to the place of maintenance, as well as water quality, both physical, chemical and biological parameters must be considered according to the ideal needs of the fish being cultivated (Jaja, 2013). Aquaculture is one solution that can be done, given the production that can be controlled both with innovative technology and capacity. Aquaculture can be defined as human intervention to increase aquatic productivity through aquaculture. The cultivation activities in question are maintenance activities to reproduce (production), grow (enlargement) and improve the quality of aquatic biota so that profits are obtained.

Barito Kuala Regency, whose capital is in Marabahan, is located in the westernmost of the Province of South Kalimantan. Since 2011 the Government of Barito Kuala Regency through the Maritime Affairs and Fisheries Service has procured 286 HDPE (High-density polyethylene) floating net cage assets to lend to the public or fish cultivators (Rudini, et al. 2018). Administratively, Barito Kuala district is

one of the regencies in the province of South Kalimantan. Fishery activities in Barito Kuala district are developing starting from the north, namely Kuripan sub-district in the form of catching in rivers, growing toman, betutu, catfish and tilapia. Tilapia (*Oreochromis niloticus*) is one of the most popular freshwater commodities, both local and foreign. According to KKP (2013), tilapia production fluctuates every year (Putra et al, 2011).

Tilapia (*Oreochromis niloticus*) is a fishery commodity that is popular with the public in meeting their needs for animal protein because it has thick flesh and good taste. Tilapia is also a potential fish for cultivation because it is able to adapt to environmental conditions with a wide range of salinity (Hadi. 2009). The relationship between fisheries and poverty is complex and not always well understood (Bene et al, 2011). One of the obstacles in the aquaculture business that many cultivators complain about is the high price of commercial feed. Feed as a source of energy for growth is the largest component of production costs, namely 40-89% (Afrianto and Evi, 2005). In addition, commercial feed has a protein content of around 26-30%, so if the feeding management is not good, it can cause ammonia accumulation which accelerates the decline in water quality (Rohmana, 2009). The cultivators also do not calculate the labor costs for providing feed because the direct business actors do this. Cultivators also have problems, namely reduced profits each time they harvest

compared to previous years. The aim of the study was to analyze the benefits and feasibility of cultivating tilapia in floating net cages in Barito Kuala Regency, South Kalimantan.

2. METHOD

This research was conducted in Marabahan District, City of Barito Kuala Regency with consideration of the number of fish cultivators in floating net cages. Research respondents were tilapia cultivators in net cages in Barito Kuala District. The study used 2 respondents who were given floating net cage loan assistance from the government, but the 1st respondent for feed and seeds came from their own funds, while the 2nd respondent the cost of tilapia cultivation in floating net cages for feed and seeds also came from government assistance.

Profit Analysis

Tilapia aquaculture in floating net cages is said to be profitable if the revenue value is greater than the total expenditure.

According to Soekartawi (2003), profit analysis can be calculated mathematically using a formula:

$$\pi = TR - TC$$

Where:

- π = Profit (Rp)
- TR = Total Revenue (Rp)
- TC = Total Cost atau (Rp)

With Criteria:

- TR > TC, then the business is profitable.
- TR < TC, then the business is a loss.
- TR = TC, then the business is break even.

The total revenue is all the results obtained from the sale of all production results where the formula is:

$$TR = P \times Q$$

Where :

- P = Price (Rp)
- Q = Quantity (Kg)

The total costs incurred in one production period consist of fixed costs and variable costs. The formula is:

$$TC = FC - VC$$

Where;

- FC = Fixed Cost (Rp)
- VC = Variabel Cost (Rp)

Business Feasibility Analysis

To analyze the feasibility of investing in floating net tilapia aquaculture in Barito Kuala district, calculations on investment criteria are used which include Net Present Value (NPV), Net Benefit Ratio (NBCR), and Internal Rate of Return (IRR). With the conditions that are:

1. Interest rate (discount factor) of 6% as the effective interest rate per year for the current micro people's business credit (KUR).
2. The period of the company and the age of the project are adjusted to the maximum period of repayment of people's business loans applied by banks 3 years for micro business loans.

Calculation of investment criteria refers to the formula rewritten as follows:

$$NPV = \sum_{t=0}^n \frac{B_t - C_t}{(1+i)^t}$$

With the following criteria:

- a. If the NPV is positive (+), then the business is profitable and worth pursuing.
- b. If the NPV is negative (-), then the business is unprofitable and not worth pursuing

By criteria:

- a. Net B/C ratio > 1 Business is feasible to be run (Profit)
- b. Net B/C ratio < 1 The business is not viable (Loss)
- c. Net B/C ratio = 1 Business is neither profitable nor detrimental

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} (i_2 - i_1)$$

With the following criteria:

- a. If the IRR > the prevailing interest rate, then the business is able to return the service fee from the amount of invested capital and get a profit.
- b. If the IRR < the prevailing interest rate, then the business is unable to return the service fee from the amount of invested capital and does not incur a loss.
- c. If IRR = the prevailing interest rate, then the business is not able to return the service fee from the amount of capital invested and does not get a profit.

3. RESULTS AND DISCUSSION

The perpetrators of the floating net cage fish cultivation business, amounting to 2 respondents. The results of the feasibility and sensitivity analysis of tilapia (*Oreochromis niloticus*) floating net cage aquaculture in Barito Kuala Regency. Costs for business activities in floating net cages for the people of Barito Kuala Regency include operational costs and fixed costs. Operational costs per production period of the floating net cage business in Barito Kuala Regency are in the following table:

Table 1. Variable/not fixed costs

No.	Manager Name	Cost component		
		Tilapia Seed(Rp.)	Fish feed (Rp.)	Manpower (Rp.)
1	Respondent 1	1.250.000,00	3.530.000,00	1.000.000,00
2	Respondent 2	1.800.000,00	5.130.000,00	2.000.000,00

The table 1 operational cost component per cultivation season consists of the cost of purchasing fish feed and fish seeds and labor wages. Total variable costs / not fixed Rp. 5,790,000.00 to Rp. 8,930,000.00 Based on the calculation of the cost variable, it shows that the largest cost component comes from purchasing fish feed, reaching around Rp. 3,530,000.00 to Rp. 5,130,000.00 per production period. Feed costs range from 70.64% to 77.58% of the total operational costs due to the fact that growing fish in floating net cages requires intensive artificial feeding. The next variable cost component is the cost of procuring tilapia seeds, which reaches a range of 20.68% to 27.47% of the total workforce operational costs or a range of Rp. 1,125,000.00 to Rp. 2,125,000.00 per production period. The tilapia seeds were spread in the respondents' floating net cages with sizes between 4-8 cm with a stocking density of 5,000-6,000 individuals. For the manager of Respondent 1 he spread 5,000 seeds with a size of 4-6 cm at a price of Rp. 250.00 per head based on subsidies from the Barito Kuala District Fisheries Service, while

for Respondent 2 managers with a seed stocking size of 6,000 6-8 cm sized individuals at a price of Rp. 300.00 per head purchased without subsidies. Where the total purchase cost of tilapia per production period is Rp. 1,250,000.00 to Rp. 1,800,000.00. From the two managers of floating net cages who were the respondents, they got seeds from different sellers. The seeds used by respondent Rahmat were from Government Assistance, while Respondent 2 was not from related government assistance.

According to research conducted by Wijayanto (2019), operational costs are one of the main factors that influence the profitability of tilapia aquaculture in floating net cages. This study shows that the operational costs of tilapia aquaculture in floating net cages reach 70.74% of the total business income. In addition, another study conducted by Fitriana (2018) showed that fish feed costs are the largest operational cost component in tilapia aquaculture in floating net cages. The cost of fish feed can reach 47.7% of the total operational costs.

Table 2. Fixed Costs of Floating Net Cages Business

No	Manager Name	Cost component	
		FNC Maintenance Costs	Rent FNC / year
1.	Respondent 1	Rp 3.520.000,00	Rp 100.000,00
2.	Respondent 2	Rp 3.445.000,00	Rp 100.000,00

Source: Primary Data

Note: Tilapia floating net cage maintenance consists of several components, namely hapa treatment, cage cover, float and cage trim.

The total income from the tilapia floating net cage business from the manager of Respondent 1 during the study period was Rp. 36,301,000.00 was generated from the first period, which was Rp. 11,315,000.00 for the second period of Rp. 12,245,000.00 and the third period of Rp. 12,741,000.00. While the total income from the tilapia floating net cage

business from the manager of Respondent 2 during the study period was Rp. 37,200,000.00 was generated from the first period, which was Rp. 12,090,000.00 for the second period of Rp. 12,400,000.00 and the third period of Rp. 12,710,000.00.

Table 3. Business Income of Tilapia Floating Net Cages

No	Manager Name	Revenue per Period (Rp.)		
		I	II	III
1.	Respondent 1	Rp. 11.315.000,00	Rp. 12.245.000,00	Rp. 12.741.000,00
2.	Respondent 2	Rp. 12.090.000,00	Rp. 12.400.000,00	Rp. 12.710.000,00

Source: Primary Data

The tilapia floating net cage (FNC) business in Barito Kuala Regency has the

potential to generate significant income. Income from the tilapia FNC business depends

on the volume of fish production and the selling price obtained.

Profit and loss

The following is an overview of the profits/losses of the tilapia floating net cage business from 2 (two) managers which can be seen in the table below.

Table 4. Profit/Loss Summary of Floating Net Cages Business

No	Description	Manager Name	
		Respondent 1	Respondent 2
1.	Period I Income	Rp. 11.315.000,00	Rp. 12.090.000,00
	Period II Income	Rp. 12.245.000,00	Rp. 12.400.000,00
	Period III Income	Rp. 12.741.000,00	Rp. 12.710.000,00
2.	Gross Profit I	Rp. 5.410.000,00	Rp. 3.035.000,00
	Gross Profit II	Rp. 6.340.000,00	Rp. 3.345.000,00
	Gross Profit III	Rp. 6.836.000,00	Rp. 3.655.000,00
3.	Period I tax (10%)	Rp. 541.000,00	Rp. 303.500,00
	Period II tax (10%)	Rp. 634.000,00	Rp. 334.500,00
	Period III tax (10%)	Rp. 683.600,00	Rp. 365.500,00
4.	Net Profit I	Rp. 4.869.000,00	Rp. 2.731.500,00
	Net Profit II	Rp. 6.202.000,00	Rp. 3.010.500,00
	Net Profit III	Rp. 6.152.400,00	Rp. 3.289.500,00

Source: Primary Data

An overview of the profits/losses of the tilapia floating net cage business in Barito Kuala Regency can be seen from the results of the analysis of operating costs and income. The results of this analysis can be used to determine business feasibility and future development strategies. Based on the results of a cost and income analysis conducted by Sofyan (2019) in Barito Kuala District, the operational costs incurred by the Tilapia Floating Net Cages (FNC) business include the costs of fish seed, feed, fuel, transportation, and labor. Meanwhile, income is derived from the sale of tilapia produced by FNC.

From the results of this analysis, it can be seen the amount of profit or loss generated by the Tilapia FNC business. If the income earned is greater than the operational costs incurred, then the business can be said to be profitable or profitable. However, if the operating costs are greater than the income earned, then the business can be said to be at a loss or unprofitable. By knowing the profit/loss overview of the Tilapia FNC business in Barito Kuala Regency, an evaluation and decision can be made to develop the business in the future, such as increasing production or reducing operational costs to increase the profit generated.

Business Profit Analysis

Table 5. Business Profit Analysis

No.	Description	Respondent 1	Respondent 2
1	Total Revenue (TR)	-	-
	Period I	Rp. 11.315.000,00	Rp. 12.090.000,00
	Period II	Rp. 12.245.000,00	Rp. 12.400.000,00
	Period III	Rp. 12.741.000,00	Rp. 12.710.000,00
2	Total Cost (TC)	-	-
	Period I	Rp. 8.620.000,00	Rp. 8.650.000,00
	Period II	Rp. 8.370.000,00	Rp. 8.400.000,00
	Period III	Rp. 8.400.000,00	Rp. 8.500.000,00
3	Profit (π)	-	-
	Period I	Rp. 2.695.000,00	Rp. 3.440.000,00
	Period II	Rp. 3.875.000,00	Rp. 4.000.000,00
	Period III	Rp. 4.341.000,00	Rp. 4.210.000,00
Conclusion		Profit	Profit

Source: Primary Data

The biggest profit was obtained from the floating net cage business managed by

Respondent 1 in the amount of Rp. 4,341,000.00 in the second period of planting, while the smallest profit was obtained from the floating net cage business managed by Respondent 2 of Rp. 4,210,000.00 in the first period of planting. Based on these results, the profits obtained by tilapia cultivators in floating net cages are still below Barito Kuala Regency in 2022, namely IDR 3,149,977.

The feasibility analysis of floating net cages for the people of Barito Kuala Regency uses several eligibility criteria, namely Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit/Cost Ratio (Net B/C), and Profitability Index (PI). All business feasibility analysis results use the assumption of 100% own capital and 30% loan capital. Following are the results of the feasibility analysis of community floating net cages in Barito Kuala Regency.

Business Feasibility Analysis

Table 6. Net Present Value (NPV) Calculation Results

No.	Description	Period	Manager Name	
			Respondent 1	Respondent 2
A Inflow				
1	Total Sales	I	Rp. 11.315.000,00	Rp. 12.090.000,00
		II	Rp. 12.245.000,00	Rp. 12.400.000,00
		III	Rp. 12.741.000,00	Rp. 12.710.000,00
2	Project Residual Value	I	0	0
		II	0	0
		III	0	0
	Total Inflows	I	Rp. 11.315.000,00	Rp. 12.090.000,00
		II	Rp. 12.245.000,00	Rp. 12.400.000,00
		III	Rp. 12.741.000,00	Rp. 12.710.000,00
B Outflow				
1	Operating costs	I	Rp. 6.370.000,00	Rp. 6.400.000,00
		II	Rp. 6.370.000,00	Rp. 6.400.000,00
		III	Rp. 6.400.000,00	Rp. 6.500.000,00
2	Fixed cost	I	Rp. 2.250.000,00	Rp. 2.250.000,00
		II	Rp. 2.250.000,00	Rp. 2.250.000,00
		III	Rp. 2.250.000,00	Rp. 2.250.000,00
	Total Outflow	I	Rp. 8.620.000,00	Rp. 8.650.000,00
		II	Rp. 8.620.000,00	Rp. 8.650.000,00
		III	Rp. 8.650.000,00	Rp. 8.750.000,00
C Net Cash Flow				
		I	Rp. 2.695.000,00	Rp. 3.440.000,00
		II	Rp. 3.625.000,00	Rp. 3.750.000,00
		III	Rp. 4.091.000,00	Rp. 3.960.000,00
D DF 7%				
		I	0.93	0.93
		II	0.87	0.87
		III	0.82	0.82
E Present Value (PV)				
		I	Rp. 2.518.692,00	Rp. 3.214.953,00
		II	Rp. 3.166.215,00	Rp. 3.275.395,00
		III	Rp. 3.339.475,00	Rp. 3.232.540,00
	Total PV		Rp. 9.024.382,00	Rp. 9.722.888,00
F	Investment		Rp. 8.463.333,00	Rp. 8.516.667,00
G	Net Present Value (NPV)		Rp. 561.048,00	Rp. 1.206.221,00
Conclusion			Feasible	Feasible

Net Present Value is an estimate of cash flows made in the future and adjusted to current conditions. The purpose of calculating the Net present value is to find out the current asset or cash value of the aquaculture business and to balance it with the future cash value.

Based on the results of the calculation of the Net Present Value with a Discount Factor (DF) of 7% in Table 6. above, it can be seen that the floating net cage business of the people of Barito Kuala Regency with the

manager of Respondent 1 can produce a positive NPV of Rp. 561,048.00 then the manager of Respondent 1 can generate a positive NPV of Rp. 1,206,221.00 and Respondent 2 managers can generate a positive NPV of Rp. 1,284,050.00 which means that the floating net cage business of the 2 (two) managers will provide a profit of Rp. 561,048.00 and Rp. 1,206,221.00 for 3 periods of the project life according to the present time value. Thus, based on the feasibility criteria NPV is greater than 0, it can

be said that the floating net cage business from the 2 (two) managers is feasible to be cultivated.

Fitriana et al (2018) It is also important to carry out risk analysis to identify the risks that may occur in the tilapia FNC business and determine the appropriate risk management strategy. Some common risks that occur in the tilapia FNC business include the risk of crop failure, fish health risks, and risks of natural disasters. By conducting a comprehensive analysis of the feasibility of the tilapia business in FNC and using various methods, it can assist business actors in making the right investment decisions and managing risks more effectively.

Internal Rate of Return (IRR)
IRR is the interest rate which, when

used to discount all the difference in incoming cash in project years, will generate the same amount of cash as the project investment. To get the IRR value, the interest rate is determined when the NPV = 0. The IRR can describe the interest rate of return on invested capital. In the investment criteria, the IRR must be greater than the opportunity cost of capital so that the investment plan or proposal can be feasible.

Table 7. Calculation results of the Internal Rate of Return (IRR)

No.	Description	Period	Manager Name	
			Respondent 1	Respondent 2
A				
Inflow				
1	Total Sales	I	Rp. 11.315.000,00	Rp. 12.090.000,00
		II	Rp. 12.245.000,00	Rp. 12.400.000,00
		III	Rp. 12.741.000,00	Rp. 12.710.000,00
2	Project Residual Value	I	0	0
		II	0	0
		III	0	0
	Total Inflows	I	Rp. 11.315.000,00	Rp. 12.090.000,00
		II	Rp. 12.245.000,00	Rp. 12.400.000,00
		III	Rp. 12.741.000,00	Rp. 12.710.000,00
B				
Outflow				
1	Operating costs	I	Rp. 6.370.000,00	Rp. 6.400.000,00
		II	Rp. 6.370.000,00	Rp. 6.400.000,00
		III	Rp. 6.400.000,00	Rp. 6.500.000,00
2	Fixed cost	I	Rp. 2.250.000,00	Rp. 2.250.000,00
		II	Rp. 2.250.000,00	Rp. 2.250.000,00
		III	Rp. 2.250.000,00	Rp. 2.250.000,00
	Total Outflow	I	Rp. 8.620.000,00	Rp. 8.650.000,00
		II	Rp. 8.620.000,00	Rp. 8.650.000,00
		III	Rp. 8.650.000,00	Rp. 8.750.000,00
C				
Net Cash Flow				
		I	Rp. 2.695.000,00	Rp. 3.440.000,00
		II	Rp. 3.625.000,00	Rp. 3.750.000,00
		III	Rp. 4.091.000,00	Rp. 3.960.000,00
D				
DF 7%				
		I	0.93	0.93
		II	0.87	0.87
		III	0.82	0.82
E				
Present Value (PV)				
		I	Rp. 2.518.692,00	Rp. 3.214.953,00
		II	Rp. 3.166.215,00	Rp. 3.275.395,00
		III	Rp. 3.339.475,00	Rp. 3.232.540,00
	Total PV		Rp. 9.024.382,00	Rp. 9.722.888,00
F				
Investment				
			Rp. 8.463.333,00	Rp. 8.516.667,00
G				
Net Present Value (NPV)				
			Rp. 561.048,00	Rp. 1.206.221,00
H				
IRR (Internal Rate of Return)				
			8,07%	4,06%

The main function of calculating the IRR is to measure aquaculture activities whether these activities will experience an increase or not. Based on the results of Rahmat's floating net cage business IRR of 8.07%, which means that the floating net cage

business will provide a profit rate of 8.07% per planting period. The value is also greater than the required interest rate of 7%, so it can be said that the floating net cage business can be interpreted as being able to return service fees from the amount of invested capital and get

profits. Meanwhile, the IRR of Respondent 2's floating net cage business was 4.06%, which means that the floating net cage business will provide a profit rate of 4.06% per planting period. However, the value is less than the required interest rate of 7%, so the business is unable to return the service fee from the amount of invested capital and does not incur a loss. Research by Rismawati et al. (2017) showed that investment in tilapia floating net cages business had an IRR of 20.93%. These results indicate that investment in this business can provide high profits and is feasible to run. A study conducted by Yusuf and Kurniawan (2019) showed that the IRR for tilapia floating net cages was 19.33%. This study shows that the business can generate decent profits, especially if it is carried out with good and efficient cultivation techniques.

4. CONCLUSION

The results of the analysis of the calculation of profit (π) for tilapia cage business can be stated that the tilapia cage business of the two managers each generates profits in 3 (three) study periods, marked by the criteria $TR > TC$ where the total business revenue is greater than the total costs incurred. issued for production. The results of the financial feasibility analysis of tilapia cage business from 2 (two) managers stated that they had met the business feasibility criteria in 3 (three) study periods. This can be seen from the Net Present Value which has a positive value and the Internal Rate of Return which is greater than the required interest rate..

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