The Financial Feasibility Analysis of Freshwater Fishing Business in Tempe Lake Waters After Revitalization

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ABSTRACT

The freshwater fishing business in Lake Tempe is the main livelihood for the coastal societies around Lake Tempe. In recent years, there have been floods due to the overflow of Lake Tempe, which caused losses to fishermen. One of the causes is the high sedimentation every year. The lake revitalization program is the way to solve this problem. The revitalization process provides social and economic changes to the society in the Lake Tempe area It has an impact on improving the economy of fishermen's households. This research aimed to analyze the financial feasibility of freshwater fishing based on the fishing gear used, namely gill nets, longlines, and traps. This research was carried out on the coast of Lake Tempe, namely Tempe, Sabbangparu, Tanasitolo, and Belawa Districts in Wajo Regency from March to June 2022. The researchers chose the location in a purposive way. This research is survey research. Data analysis used financial analysis by looking at the net present value (NPV), Net Benefit Cost (net B/C), Internal Rate of Return (IRR), and Payback Period (PP). The results showed that the large profits obtained from the catching freshwater fish business in Lake Tempe using gill nets were 13,526,859 (IRD) per year, then the longline fishing gear gains a profit of 10,557,023 (IRD), and for fishing traps gear, the profit is 7,548,808 (IRD). The acquisition of each financial analysis obtained by NPV>0, net B/C>1, IRR>the applicable interest rate is 5%, and the payback period is less than 5 years. Therefore, it concluded that these three types of fishing gear are feasible to be developed.

Keywords: Revitalization; Financial Feasibility; Freshwater Fish; Tempe Lake

1.   INTRODUCTION

The waters of Lake Tempe are one of the largest lakes in the world; Lake Tempe is located in South Sulawesi Province, which consists of Lake Tempe, Sidenreng, and Lapongpakka. Administratively, Lake Tempe is located in 3 districts, namely Wajo, Sidrap, and Soppeng. Based on its geographical location, Lake Tempe is a natural resource ecosystem area that is connected and integrated into three regencies: Wajo, Soppeng, and Sidrap. The lake becomes a very important resource for the people who live around it, especially for the fishing community. Since a long time ago, people have placed Lake Tempe as a part of themselves (Hamka & Hamka, 2019). Almost all of the people's income on the coast of Lake Tempe comes from the lake either during the dry season or the rainy season to floods.

Lake Tempe resources are utilized by several different types of utilization and across sectors. Muliawan & Priyatna stated that the research got information that the types of utilization are fish catching, agriculture, and transportation (2008). The Lake Tempe area, related to the management of fishery resources, has been regulated through the regional regulation of Wajo Regency Number 4 of 2012 concerning the management of fishery resources (Wajo Regency Government, 2012). The problems in Lake Tempe are very complicated and complex; various factors influence and are interrelated, and both ecosystems in the lake waters themselves and outside the lake area contribute to the damage to the abiotic and biotic environmental ecosystems that occur in Lake Tempe at this time (Zamzani et al., 2022). The utilization of Lake Tempe resources every time has decreased both in terms of quality and quantity, which is quite significant, therefore, every year, there is a decrease in fish catches by fishermen (Suriadi et al., 2017). Communities with various resilience efforts respond to disasters that hit the lake both in the rainy season and in the dry season (Yusran et al., 2019).

The main problem in Lake Tempe is the sedimentation. The Ministry of Public Works and Public Housing (PUPR) designated Lake Tempe as one of the critical lakes in Indonesia. The Ministry of Public Works and Public Housing (PUPR) provided a solution for the government to revitalize the lake in the form of dredging sediment and cleaning water hyacinths.

The revitalization of Lake Tempe, especially in Wajo Regency, received different responses from the community. People who are often affected by floods and

overflows of Lake Tempe support the revitalization, in contrast to the society who use Lake Tempe's land for farming in the dry season, they rejected revitalization. They reject it because the agricultural land that is usually used by the community will disappear, and it makes them forced to look for other livelihood sources to meet their daily needs (Darti et al., 2021).

The revitalization of Lake Tempe is one of the triggers for socio-economic changes that occur in coastal communities in the Lake Tempe area, where the people in the Lake Tempe area have not received optimal benefits from the resources that they have so that the economic condition of the people in the Lake Tempe area can still be improved by optimizing the potential of existing freshwater fishery resources, especially after the revitalization.

Economic valuation is one of the instruments used to calculate the value strategy of the Tempe Lake area. This calculation is able to increase public and government appreciation and awareness of goods and services produced by natural resources and the environment. Direct benefits from the Lake Tempe area, Wajo Regency, is Rp. 571,395,793,250. The potential of resources in the lake seems very large (Belana, 2021). The existence of economic activities in the lake area results in pollution that occurs around the lake (Bare et al., 2021).

Therefore, from the economic aspect, it has an impact on improving the economy of fishermen's households. The fishermen in Lake Tempe catch freshwater fish using gill nets, longlines, and traps. Researchers use that condition as the basis of research to see the value of profits in freshwater fishing in Lake Tempe after the revitalization. This research aimed to determine the feasibility aspect of catching freshwater fish in Lake Tempe using gill nets, longlines, and traps.

2.   RESEARCH METHODS

This research was conducted on the coast of Lake Tempe, 4 (four) Districts, namely Tempe District, Sabbangparu District, Tanasitolo District, and Belawa District in Wajo District from March to June 2022. The researchers chose Lake Tempe because it is one of the lakes that has freshwater fishery resources. It can be utilized and it has the potential to be developed with revitalization. The type of research is survey research (Singarimbun, 2008).

The population in this research is the households of coastal communities, namely Lake Tempe fishermen, who are located in 4 (four) sub-districts in Wajo Regency. Determination of the sample was initially carried out with a cluster random sampling system, which is a sampling technique that is applied when the population found to be in groups that look uniform but internally remain different.

To find out about the feasibility of catching freshwater fishery resources, a cost and income analysis is first carried out to determine the flow of costs, revenues, and revenues. Then, the next step was financial analysis used to compare costs and benefits to determine whether a business will be profitable using the following analysis:

a. To find the total cost in the fishing gear business using quantitative descriptive analysis:
$$TC = TFC + TVC$$
Description:
TC   = Total Cost (IRD)
TFC   = Total Fixed Cost(IRD)
TVC   = Total Variable Cost (IRD)

b. Income. To find out the income of a fishing gear business, use the following analysis (Wilson, 2010):
$$TR = P.Q$$
$$\pi = TR - TC$$
Description:
π = Profit
TR   = l (Total Revenue)
TC   = Total Cost
P   = Selling Price
Q   = Number of fish sold

c. Net Present Value (NPV). Net Present Value (NPV) can be formulated as follows (Pasaribu et al., 2005):
$$NPV = \sum_{t=0}^{t=n} \frac{Bt - Ct}{(1+r)^t}$$

Description:
Bt = annual gross income
Ct = Annual gross cost
$(1+r)t$ = discount factor (DF)
t = bank interest rate

d. Net Benefit - Cost Ratio (Net B/C). Net benefit Cost ratio (Net B/C) can be formulated as follows (Pasaribu et al., 2005) :
$$Net\ B/C = \frac{\sum_{t=0}^{t=n}\ NPV\ (+)}{\sum_{t=0}^{t=n}\ NPV(-)}$$

Description:
NPV (+) = NPV positive value
NPV (-) = NPV negative value

f.   Internal Rate of Return (IRR). Internal Rate of Return (IRR) can be formulated as follows (Pasaribu et al., 2005) :
$$IRR = i' + \left(\frac{NPV'}{NPV' - NPV^-}\right)(i'' - i')$$

Description:
i'   = The interest rate that produces a positive NPV

The Financial Feasibility Analysis of Freshwater Fishing Business in Tempe Lake Waters After
Revitalization   23

i"   = The interest rate that produces a negative NPV
NPV'   = NPV at interest rate i'
NPV''   = NPV at interest rate i"

g. Payback Period. The payback period can be formulated as follows (Pasaribu et al., 2005):

$$PP = \frac{I}{Bt}$$

Description:
PP   = Payback Period
I   = Investment Amount
Bt   = Net Benefit on average each year

used the full-year investment component based on the fishing gear used.

3.   THE RESULTS AND DISCUSSION

The investment in the freshwater fishing effort of Lake Tempe in Wajo Regency has investments that support the operation of its business. Respondents

Table 1 The components of investment in freshwater fishing in Lake Tempe

Investment Types	Investment Types	Investment Types	Investment Types
Boat	3,886,364	3,750,000	4,000,000
Machine	2,250,000	2,200,000	2,166,667
Catching tool	2,954,545	3,150,000	515,833
Total Investment	**9,090,909**	**9,100,000**	**6,682,500**

Based on table 1 shows that the investment value in freshwater fishing activities in Lake Tempe using gill net fishing gear has the average total investment value of Rp. 9,090,909. Then, longline fishing gear has an average total investment value of Rp. 9,100,000 . Trap fishing gear has an average total investment value of Rp. 6,682,500. The types of investment costs in freshwater fishing activities in Lake Tempe using various fishing gear, namely gill nets, longlines, and traps, have different average values where the investment is based on fishing gear in like boats, machines, and fishing itself

The fixed costs are the costs that do not depend on the volume of production. These costs continue to be incurred, even though the catch of fish obtained by fishermen is large or small. If the arrest process is not carried out, these costs must still be incurred. Fishermen have different fixed cost components depending on the investment component that they have. The amount of fixed costs used by fishing fishermen in Wajo Regency is the average value of the costs incurred by fishermen without depending on the volume of production. The components of the fixed costs of freshwater fishing in Lake Tempe for a full year based on the fishing used can be seen in the table below.

Table 2 The fixed costs of freshwater fishing in Lake Tempe

Fixed cost	Gill Nets (IRD)	Longline Tool (IRD)	Traps (IRD)
Boat Shrink	816,342	735,119	756,151
Machine Shrink	427,435	394,762	417,063
Fishing Equipment Depreci	**738,636**	845,000	**173,278**
Total Fixed Cost	**1,982,413**	**1,974,881**	**1,346,492**

Based on table 2 shows that the value of fixed costs in freshwater fishing activities in Lake Tempe using gill nets has an average total fixed cost of Rp. 1,982,413. Longline fishing gear has an average total fixed cost of 1,974,881 (IRD). The woven trap fishing gear has an average total fixed cost of 1,346,492 (IRD). The types of fixed costs used in freshwater fishing activities in Lake Tempe using gill nets, longlines, and traps. The average value of fixed costs is the depreciation of each type of investment with various technical

ages. Based on the results of this research, it was found that the investment in the type of ship and engine ware the longest technical life. This is because these types of ships and engines have a long service life.

The variable costs are the costs that, if it associated with the volume per unit, will always remain even though the production volume varies. However the total of these costs will change according to the proportion of changes in activity. Expenditures on variable costs in a full-year fishing effort based on the fishing gear used can be seen in the table below.

The Financial Feasibility Analysis of Freshwater Fishing Business in Tempe Lake Waters After Revitalization

Table 3 The variable costs of freshwater fishing in Lake Tempe

Variable Cost	Gill Nets (IRD)	Longline (IRD)	Traps (IRD)
Consumption	6,038,182	5,400,000	4,950,000
Petrol or Fuel Oil	1,752,545	1,982,880	1,514,700
Total Variable Cost	**7,790,727**	**7,382,880**	**6,464,700**

Based on Table 3 shows that the value of variable costs on freshwater fishing activities in Lake Tempe using gill net fishing gear has an average total variable cost of 7,790,727 (IRD). Longline fishing gear has an average total variable cost of 7,382,880 (IRD). Then, the traps fishing gear has an average total variable cost of 6,464,700 (IRD). Therefore, the variable costs of fishing activities in Lake Tempe depending on the length of time working for one trip. The fishermen in Lake Tempe work an average of 1 day per trip. The average total costs incurred by fishing businesses in Wajo Regency/per year can be seen in the table below.

Table 4 Total cost of fishing effort by fishing gear

Catching Tool	Total Fixed Cost (IRD)	Total Variable Cost (IRD)	Total Cost (IRD)
Gill Nets	1,982,414	7,790,727	9,773,141
Longline	1,974,881	7,408,096	9,382,977
Traps	1,346,492	6,464,700	7,811,192

The total cost incurred by each respondent in the freshwater fishing business unit on the coast of Lake Tempe using gill nets, longlines, and traps in a year is the sum of fixed costs and variable costs incurred each year.

Revenue is the total amount generated multiplied by the current price. The amount of production and selling price of fish in each region is different. The average value of production revenue from Lake Tempe freshwater fish catches in Wajo Regency in one year can be seen in the table below:

Table 5 Cost of fishing business revenue by fishing gear

Catching Tool	Total production/year (kg)	Price (IRD)	Total Revenue (IRD)
Gill Nets	2,330	10,000	23,300,000
Longline	1,994	10,000	19,940,000
Traps	1,536	10,000	15,360,000

Based on the results of this research, it was seen that the average number of freshwater fish production is based on fishing gear each year. The amount of production obtained is the result of catching carried out for one year. It can be seen in table 5 for gill net fishing gear as much as 2,330 kg/year, longline fishing gear as much as 1994 kg/year and trap fishing gear as much as 1536 kg/year. From these production results, the total income obtained by fishermen who carry out freshwater fishing in Lake Tempe based on gill net fishing gear is 23,300,000 (IDR), then longline fishing gear 19,940.00 (IDR), and for trap fishing gear 15,360,000 (IDR) per year.

The income. Net income is the difference between the sales of production and operating costs. Analysis of operating income used to determine the profits obtained by the Lake Tempe freshwater fishing business in Wajo Regency per year. Each fisherman has a different amount of profit because the calculation of profits is influenced by the components of total costs and revenues. The profit of freshwater fishing in Lake Tempe based on fishing gear in one year can be seen in the following table:

The Financial Feasibility Analysis of Freshwater Fishing Business in Tempe Lake Waters After Revitalization   1

Table 6 Income from freshwater fishing in Lake Tempe

No	Catching Tool	Total Revenue (IRD)	Total Cost (IRD)	Profit (IRD)
1	Gill Nets	23,300,000	9,773,141	13,526,859
2	Longline	19,940,000	9,382,977	10,557,023
3	Traps	15,360,000	7,811,192	7,548,808

Based on Table 6, the business income of freshwater fishing units on the coast of Lake Tempe using gill nets, longlines, and traps is the net income obtained from the total revenue minus the total cost. The business income of freshwater fishing units on the coast of Lake Tempe using gill nets, longlines, and traps is quite large because it is influenced by the clear market potential of freshwater fish and it is the main commodity fish for daily consumption. According to (Najamuddin et al., 2017), the results of fish production are very closely related to the price of fish, when fish production is greater, the income will be higher as well.

Financial Analysis of Freshwater Fishing Business. The total income obtained from freshwater fishing in Lake Tempe is a measure of business success that should be maintained, and it has good continuity even after revitalization. After the income analysis of the economic aspect, it continued with a business feasibility analysis to see if the ability of the freshwater fishing business in Lake Tempe will be sustainable or it will have losses in a certain year. The results of business financial analysis calculate business feasibility indicators consisting of Net Present Value (NPV), Net B/C, IRR, and Payback Period as follows:

Table 7 Financial Feasibility Analysis of Freshwater Fishing Business in Lake Tempe

Fishing Gear Used	Financial Analysis			
	NPV (IDR)	Net B/C	IRR	PP (Year)
Gill Nets	20,113,027	3,33	57%	1,4
Longline	6,650,455	2,13	28%	3,1
Traps	1,481,817	1,41	13%	3,8

Based on Table 7 above, it can be seen that the activity of catching freshwater fish on the coast of Lake Tempe using gill nets, longlines, and traps is financially feasible. This can be seen from the Net Present Value (NPV) of each fishing gear that has a positive number (greater than zero) at the applicable interest rate of 5%, which means the businesses will have a positive benefit residual value at the end of the activity year in 10 years project period. The NPV value for catching freshwater fish on the coast of Lake Tempe based on fishing gear, namely for gill nets, is. 20,113,027 (IDR), for longline fishing gear 6,650,455 (IDR) and trap fishing gear 1,481,817 (IDR). Thus, the production of freshwater fishing on the coast of Lake Tempe has a good continuity value, so it is feasible to continue.

The analysis of the Net Benefit-Cost Ratio (Net B/C Ratio) obtained from the comparison of positive net benefits and negative net benefits is the value of benefits that will be obtained from every one rupiah of costs (costs) incurred during the life of the business at an annual interest rate (Gobel, 2019). Based on the fishing gear, the Net B/C value for gill net fishing gear is 3.33 which means that every 1 (IDR) spent will increase the benefit of 3.33 (IDR) and the Net

B/C value for longline fishing gear is 2.13 that means every 1 (IDR) spent will increase the benefit of 2.13. (IDR) For the Net B/C value for trap fishing gear is 1.41, which means that every 1 (IDR) spent will increase the benefit of 1.41 (IDR) .

The internal of the business value shows that the ability level to pay credit interest during business activities was analyzed using IRR (Internal Rate of Return). In the catching freshwater fish on the coast of Lake Tempe used gill nets, longlines, and traps. The IRR value for gill net fishing gear is 57%, and for longline fishing gear the IRR value is 28% and for trap fishing gear the IRR value is 13%.

The criteria for the payback period (every years)shows that freshwater fishing business activities on the coast of Lake Tempe have a relatively normal payback period because all of them are less than 5 years, namely for gill net fishing gear for 1.4 years, longline fishing gear 3.1 years and for trap fishing gear for 3.8 years.

Freshwater fishing activities in Lake Tempe using several fishing gears influence by the natural conditions and the Lake Tempe revitalization. The fishermen are getting further away from the location after the revitalization. Indirectly this affects the amount of production of fishermen's catching fish.

Based on the higher profits received, This research showed that economically the fish catch fishery

on the coast of Lake Tempe which uses gill nets, longline tool, and traps is economically feasible to develop. This can happen based on several calculation parameters, namely NPV which has a value greater than zero, IRR was greater than the social discount rate, Net B/C Ratio was greater than 1, and the payback period was in the medium category.

CONCLUSION

Freshwater fishing business in Lake Tempe has a fairly good profit after the revitalization of Lake Tempe. Likewise with the right financial analysis for the generation of freshwater fish in the Lake Tempe declared feasible to continue.

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