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BUSINESS FEASIBILITY ANALYSIS OF HAND LINE TUNA SHIP >30 GT (PAMO SHIP) AT BITUNG OCEAN FISHING PORT, NORTH SULAWESI, INDONESIA

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ABSTRACT

Bitung City is one of the centers of fishing industry activity with a very strategic location. Yellowfin tuna is the dominant species of tuna which is always caught throughout the year which is landed at the Bitung Ocean Fishing Port using hand line tuna fishing gear. This research was carried out with the aim of knowing the costs, revenues and profits, the balance value of revenues and costs (R/C ratio), the Break Even Point (BEP) of hand line tuna fishing businesses with vessels > 30 GT. This research uses descriptive quantitative and qualitative methods. Primary data and secondary data were obtained through interviews and direct observation. The results showed that the total costs in the tuna hand line business amounted to 95,509.2 USD/year, revenues of 191,018.4 USD/year and the average profit earned was 103,149.94 USD/year. The results of the Revenue Cost Ratio (R/C ratio) analysis are 2.0 so that the tuna hand line business is categorized as feasible and profitable. The results of the Break Event Point (BEP) analysis of the tuna hand line business were achieved at a total production of 7,368 kg or a selling price of 41,785.28 USD for tuna. Payback Period (PP) analysis results are 1.4 (1 year 4 months or 8 trips).

KEY WORDS

Business analysis, tuna hand line, pamo ship.

Indonesia is the biggest archipelago country in the world. Indonesia has 17,499 islands with a total area of about 7.81 million km². The ocean area of 3.25 million km² and 2.55 million km² is the Exclusive Economic Zone (EEZ). Decree of the Minister of Maritime Affairs and Fisheries Number 19 of 2022 states that the total estimated potential for fish resources in the 11 Fisheries Management Areas of the Republic of Indonesia is 12.01 million tonnes per year with an Allowable Catch Amount (JTB) of 8.6 million tonnes per year. One of the strategic fishing areas in Indonesia is the province of North Sulawesi which contributes to the national capture fisheries production of 394,697 tons or the equivalent of 5.6% of the national fishery production in 2017. North Sulawesi waters are included in the Fisheries Management Area of the Republic of Indonesia (WPP-716). One of the areas with great fishery potential with a total production of 261,928 tonnes or contributing 66.36% of North Sulawesi's fishery production. The fishery potential of North Sulawesi plays an important role in improving the welfare of local and national fishing communities.

The Ministry of Maritime Affairs and Fisheries issued a measurable fishing policy that greatly helped Bitung City in North Sulawesi as a world fisheries center. Bitung has a Special Economic Zone (KEK), where most of the businesses in it are engaged in fisheries. The city is one of the largest fishing industrial areas in Indonesia. The city of Bitung also has a type "A" fishing port that can land large amounts of fish, namely the Bitung Ocean Fishery Port.



The location of the port is also strategic because it is not too far from Sam Ratulangi International Airport which is the gateway for shipping fishery products. The fish that are mostly caught and landed at the Bitung Ocean Fishing Port are Tuna, Skipjack and Cob. Yellowfin tuna is a species of tuna that is always caught throughout the year. Yellowfin tuna is the most dominant catch, from hand line fishing gear it is recorded that 94% of the total tuna landed at the Samudera Bitung Fishing Port [3]. One type of hand-line tuna fishing vessel that is common in Bitung City is pamo boats that are over 30 GT in size.

The hand line tuna fishing business has been carried out in Bitung City for a long time, but not much is known about the process of analyzing its economic prospects. In connection with the hand line tuna fishing operations in exploiting the potential of fishery resources which are so dominant in Bitung City, it is necessary to re-examine with respect to output and input costs in the operation of vessels with hand line tuna fishing gear each trip.

Based on this, it is necessary to conduct research on the analysis of the pamo hand line tuna business with the aims of: 1) to find out the costs incurred, revenues and profits from the tuna hand line business; 2) to determine the analysis of revenue cost ratio (R/C ratio), Break Even Point (BEP) and payback period analysis of tuna hand line business using vessels >30 GT.

METHODS OF RESEARCH

The research was carried out from October 2021 to October 2022. The research location was at the Bitung Ocean Fishing Port, Bitung City, North Sulawesi. This research uses descriptive quantitative and qualitative methods. The data collected is in the form of primary data and secondary data concerning investment, production costs, production, income and estimated profits. Information from the collected data is grouped, arranged and described qualitatively, while quantitatively it is analyzed in the form of simple tabulations. Business feasibility criteria are known through criteria such as R/C ratio, BEP and PBP. Primary data and secondary data were obtained through interviews and direct observation. The sample used is 6 units of ships. Samples were selected based on purposive sampling with certain criteria, namely vessels that actively leave within a year from individual ship owners whose business criteria in fishing have been successfully developed/earned a profit. Sampling was carried out 6 trips from each ship.

According to the formula for calculating total business income, it can be done with the formula: [4]

$$TR = Q \times P$$

Where: TR is total revenue (USD); Q is the number of catches (Kg); P is the selling price per kg (USD).

Production costs are divided into 2 types, namely fixed costs, namely costs that are not used up in one production run and variable costs, namely costs that are used up in one production run. In accordance with the total cost calculation formula, the following formula is used: [11]

$$TC = FC + VC$$

Where: TC is the total cost (USD); FC is the fixed cost (USD); VC is variable cost (USD).

According to the formula for calculating business profits, it can be done with the formula: [14]

$$\pi = TR - TC$$

Where: π is profit (USD); TR is total revenue (USD); TC is the total cost (USD).

R/C ratio analysis is carried out to find out how far the rupiah value of costs used in a business can provide a number of revenue values as benefits [5]. Analysis of the R/C ratio,



namely the comparison of income with expenses: if the R/C value is above one is considered feasible, R/C below one is considered inappropriate, while R/C = 1 (trade off), it can be implemented or not depending on the party that will carry out the business. [10]. The formula used to calculate the R/C ratio is:

$$R/C \text{ ratio} = \frac{TR}{TC}$$

Where: TR is total revenue (USD); TC is the total cost (USD).

Break Even Point analysis is an analysis used to study the relationship between fixed costs, variable costs, profits and volume of activity. The calculation formula used is: [9]

$$BEP \text{ Production (Kg)} = \frac{FC}{P - V}$$

$$BEP \text{ Sales (USD)} = \frac{FC}{1 - \frac{VC}{S}}$$

Where: FC is fixed cost (USD); P is the selling price per kg (USD); V is the variable cost per kg (USD); VC is variable cost (USD); S is the amount of income (USD).

Criteria for BEP Production < total production (profit/feasible), BEP Production = total production (break even position), BEP Production > total production (loss/not feasible) [1].

The payback period (PP) is a period required to cover investment expenses [6]. PP measures how quickly an investment can return in units of time (days, months and years). PP compares the initial investment with the operational net cash inflow (estimated net cash) per year. The estimated net cash inflow is the sum of net income and depreciation in the year concerned [8]. According to the economic formula, the payback period analysis can be calculated using the formula below: [10]

$$PP = \text{Profit Investment} \times 1 \text{ Year}$$

If the PP value is less than the investment age, then the business is feasible to continue.

RESULTS AND DISCUSSION

Based on the records of the Bitung Ocean Fisheries Port, fishery production continues to experience an increase in demand from the Covid - 19 pandemic to 2022. With a buying price of tuna reaching 4,77 USD for grade AB tuna. The dominant types of fish caught are yellowfin tuna, skipjack tuna and flying fish with the aim of exporting to Japan.



Figure 1 – Pamo Hand Line Tuna Ship Size > 30 GT (Darondo, 2021)



The fishing gear used for pamo boats is hand line tuna with 20–30 crew members on each fishing trip. Fishing time is 60 days/trip. Within two months, fishermen make 1 trip while it is estimated that in 1 year at least 6 trips. Based on the results of the interviews, hand line tuna fishermen within one year, pamo hand line vessels on average actively catch fish for 6 months and 6 months do not go to sea, due to extreme weather blowing south and west winds that hit the Sulawesi Sea & Maluku Sea. The fleet used is pamo boats measuring >30 GT which have fishing trips of 3 months with fishing ground areas in WPP 716 and 717. The fishing aids used are nail boats which are loaded on board a total of 20-25 units of pakura.



Figure 2 – Pakura Boat on Pamo Boat (Darondo, 2021)

Unloading of tuna catches that landed at the wharf of the Bitung Ocean Fisheries Port which was the research location.



Figure 3 – Unloading Catch (Darondo, 2021)

Business analysis consists of investment capital, depreciation costs, production costs, revenues, profits, BEP, R/C and PP.

Investment costs are the initial costs incurred to start a tuna hand line fishing business. The total investment cost as a whole is 144.857,67 USD consisting of one unit of hand line ship that has been equipped with engines and navigational equipment and equipped with 25 units of pakura boats.

Total costs are the overall costs incurred while doing business. Total costs consist of fixed costs and variable costs. Fixed costs are costs that are fixed in a certain period and are



not affected by the amount of production. Fixed costs come from maintenance costs for fishing equipment used to conduct fishing business and depreciation in investment value. The total fixed costs incurred for each trip are 4.457,16 USD or equivalent to 26.742,95 USD per year. Variable costs are costs whose amount can change and depend on the level of production produced. Types of costs that are classified as variable costs are operational costs and profit sharing system costs. Operational costs consist of the purchase of fuel, lubricants, and consumption (food), while the total cost is not fixed for each trip 11.461,27 USD or equivalent to 68.767,6 USD. The total costs are presented in table 1.

Table 1 – Total Business Costs of Catching Hand Line Tuna

No	Fee Type	Total Cost/Trip (USD)	Total Cost/Year (USD)
1	Fixed cost	4.457,16	26.742,95
2	Variable cost	11.461,27	68.767,6
3	Total cost	15.918,42	95.510,55

Source: Primary Data (2022).

The average fish catch obtained from hand line tuna fishing by hand line tuna fishermen (pamo) for 1 trip is 10,000 kg, with a range of average tuna weight of 30 kg and up. The selling price of fish per kg during the study ranged from 4,78 USD to 5,09 USD. The average income is 31.836,85 USD per trip or the equivalent of 191.021,1 USD per year. As much as 10% of the total revenue is allocated for ship maintenance costs. Furthermore, the profit sharing system used is 60% owners, 40% anglers and masters of the total income which has been reduced by the allocation of ship maintenance costs. Estimated income is presented in table 2.

Table 2 – Total Hand Line Tuna Fishing Business Revenue

No	Description	Earnings/Trips (USD)	Income/Year (USD)
1	Fish catch	0,64	3,82
2	Price per Kg	4,78	4,78
3	Sales results	47.755,27	286.531,65
4	Income	31.836,85	191.021,1

Source: Primary Data (2022).

Profits in a business are obtained based on the difference between the total income and the total costs incurred. The average profit earned during 1 trip is 17.191,9 USD or equivalent to 103.151,39 USD within 1 year. The number of trips carried out in units of months does not always provide benefits, even fishermen get losses. However, in certain months fishermen get high profits so they can cover losses in previous months.

R/C Ratio analysis shows the extent to which the cost value used in a business can provide a number of receipts as benefits. The results of the analysis of the R/C ratio obtained a value of 2. This value indicates a value > 1 meaning that the business carried out by hand line tuna fishermen (pamo) and business activities make a profit.

BEP analysis is used as a reference to determine the minimum amount of production (Production BEP) and income (Sales BEP) that must be achieved so that hand line tuna fishing efforts do not suffer losses within 1 year. If the total revenue equals the total cost, then the business can be said to be at the breakeven point. If the total income is below the total cost, it is said that a business is experiencing a loss, and vice versa. BEP analysis is presented in table 3.

Production BEP analysis in the pamo tuna hand line business obtained a value of 7,368 kg or Sales BEP of 41.785,87 USD. This means that in 1 year fishermen must get a minimum catch of 7,368 kg of fish or sales of 41.785,87 USD. The results of the BEP analysis are closely related to fixed costs, variable costs, income and volume of fish caught. Based on the BEP Production value, the criteria for this business can be said to be profitable or feasible to continue [1].



Table 3 – Break Even Point Analysis

No	Description	Nominal
1	Fixed cost (USD)	26.742,95
2	Variable cost (USD)	68.767,6
3	Variable cost per Kg (USD)	1,15
4	Sales Volume (Kg)	60,000
5	Selling price per Kg (USD)	4,78
6	BEP Production (Kg)	7,368
7	BEP Sales (USD)	41.785,87

Source: Primary Data (2022).

Payback Period is needed to determine the investment return period and the return on capital category. The rate of return on capital is strongly influenced by the value of the investment and the profits earned. The results of the PP analysis on the pamo tuna hand line business obtained a value of 1.4. This means that the return on investment costs that have been incurred to carry out the hand line tuna fishing business on pamo ships will return within 1 year and 4 months or 8 trips. The payback period for investment costs is relatively fast. It is appropriate that the rate of return on capital in a business is categorized as fast if the PP value is <3 years [13].

CONCLUSION

From the results of the study it can be concluded as follows: 1) The total cost in the tuna hand line business is 95.510,55 USD/year, revenue of 191.021,1 USD/year and the average profit earned is 103.151,39 USD/year, 2) The results of the Revenue Cost Ratio (R/C) analysis or the comparison between revenue and total costs is 2.0 so that the tuna hand line business is categorized as feasible and profitable because $R/C > 1$. 3) The results of the analysis of the Break Even Point (BEP) or the breakeven point of the hand line tuna business were achieved at a total production of 7,368 kg or the equivalent of a sales BEP of 41.785,87 USD. 4) The results of the analysis using the Payback Period or the investment return period from this hand line tuna business, is an average of 1.4 (1 year 4 months or 8 trips).

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