Financial Analysis of The Purse Seine Fisheries Business in Panimbang Fishing Port

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Abstract. A purse seine is one of the productive fishing gear catching pelagic fish. The feasibility of the purse seine business in Panimbang was needed to analyze after the tsunami disaster in late 2018. The research aims to analyze the financial aspect of purse seine fisheries business in Panimbang fishing port. The study was conducted from May to October 2019 using survey methods. The data were collected, including investment and operational cost, amount of catches and price, and fishing unit specification. Data analysis includes calculation of benefit, Revenue Cost Ratio (R/C), Net Present Value (NPV), Net Benefit-Cost Ratio (Net B/C), Internal Rate of Return (IRR), and Payback Period (PP). The result showed the vessel of purse seine based on Panimbang used 30 GT with the vessel’s engine 120 HP. The net of purse seine was 1,000 m in length and 50 m in depth. The benefit of purse seine business was IDR 1.2 billion; revenue was IDR 3.4 billion, R/C was 1.54, NPV IDR 3 billion, Net B/C 2.58, IRR 56.57, and PP when the business reaches in 1 year seven months three days. The entire financial of purse seine after the tsunami disaster in Panimbang is still profitable and feasible.

1. Introduction
A purse seine is one of the effective fishing gear for catching pelagic fish and contributes significantly to fishery production. It effectively catches pelagic fish schooling by circling the fish schools [1], so the catch obtained in on operation is quite promising and makes the fishing gear quite productive in catching fish. A purse seine is also one of the fishing gear that can produce fish in large quantities, providing excellent benefits [2].

One of the purse seine fisheries centers in the Pandeglang Regency is at the Panimbang fishing port. Panimbang fishing port is one of the growing fish landing centers around the Sunda Strait waters. It is because Panimbang is surrounded by potential fishing ground, namely Sunda Strait, the Indian Ocean, and the Java Sea, so it has excellent potential fisheries [3].

The purse seine based on Panimbang is a purse seine owned by residents and non-resident, which initially came from Indramayu, then settled and based there. The fishing ground of purse seine is in the Lada Bay waters, which is directly opposite the Sunda Strait to South Banten's waters. Pelagic fishing activities have long developed in this area and became one of the largest pelagic fishery production centers in Pandeglang Regency and Banten Province. This condition is supported by the Sunda Strait waters, which is a fishing area for fishers [4,5].

The Sunda Strait tsunami disaster occurred in December 2018 caused fishing activities became paralyzed and stopped due to damage to boats and fisherman settlements. Capturing with purse seine has returned to activity after three months after the disaster. Based on these conditions, research is needed after tsunami financial feasibility analysis on purse seine
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fisheries business at Panimbang. It is essential to portray whether the purse seine fisheries business in Panimbang post-tsunami is still feasible and profitable to continue.

The main objective of financial feasibility is to avoid over-investing, which costs much money, which turns out to be incapable of providing economic benefits. Because the fishing business requires investment and other fishing costs, it is necessary to calculate its feasibility analysis to see its long-term prospects. Also, fishing is an economic activity that uses production inputs, so it is necessary to know when planning a fishing business [6]. A business feasibility study will guide whether the business's investment is feasible or not [7,8,9].

2. Methods
The research was conducted from June to October 2019 at Panimbang fishing port, Pandeglang Regency, Banten Province. The method used is a survey. Data collection was carried out by observation and interviews with purse seine fisheries actors. The data taken includes investment cost, fixed costs, variable costs, the number of fish caught, fishing season, fishing ground location, and fish price.

The business feasibility analysis of purse seine fisheries is carried out with the criteria of benefit (business profit), revenue cost ratio (R/C), Net Present Value (NPV), Net Benefit-Cost Ratio (Net B/C), Internal Rate of Return (IRR) and Payback Period (PP) [10,11].

2.1. Business Profit (Benefit)
Business profit is the amount of revenue after deducting the costs incurred for the production process, calculated by the following formula:

\[
\text{Profit (}\pi\text{)} = \text{Total Revenue (TR)} - \text{Total Cost (TC)}
\]

2.2. Revenue cost ratio (R/C)
Revenue cost ratio (R/C) is an analysis of revenue and cost balance, calculated by the following formula:

\[
\frac{\text{TR}}{\text{TC}}
\]

R/C > 1 means the business makes a profit; R/C < 1 means the business gets a loss, and R/C=1 means the business is at breakeven.

2.3. Net Present Value (NPV)
NPV is the net benefit that has been discounted by using the social opportunity cost of capital as the discount factor, calculated by the following formula:

\[
\text{NPV} = \sum_{i=1}^{n} (B_i - C_i) = \sum_{i=1}^{n} NB
\]

Where: B_i is a discounted benefit; C_i is discounted cost; NB is a net benefit; i is a discount factor, and n is time (year). If the NPV is more significant than zero or positive, the business produces a profit level so that it is worth continuing, and otherwise, it will lose (rejected).

2.4. Net Benefit Cost Ratio (Net B/C)
Net B/C is the ratio between the present value of the total net income to the present value of total production costs, calculated by the following formula:

\[
\text{Net B/C} = \frac{\text{total net benefit}}{\text{total production cost}}
\]

If Net B/C > 1, then the business is feasible; if Net B/C = 1, then the business breaks even, and if Net B/C < 1, then business is unfit to continue.

2.5. Internal Rate of Return (IRR)
IRR is used to determine the interest rate (discount rate) how much effort is not profitable and not a loss. IRR is a level value interest indicating that the NPV equals the total...
investment costs of the project. In other words, IRR is the value of the social discount rate, which results in an NPV equal to zero, calculated by the following formula:

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

$i_1$ is the first interest rate; $i_2$ is the second interest rate; $NPV_1$ is the first NPV value, and $NPV_2$ is the second NPV value. If the IRR value is greater than the prevailing interest rate ($IRR > i$), then a business is feasible to continue, and vice versa; if $IRR < i$, then the business should be evaluated or terminated.

2.6. Payback Period (PP)
The payback period (PP) is a period required to return the capital of investment. If it returns capital is less than one year, then the investment is profitable or feasible, calculated by the following formula:

$$\text{Payback Period (PP)} = \frac{\text{Investment}}{\text{profit}} \times 1 \text{ year}$$

3. Result and Discussion

3.1. The operation of purse seine in Panimbang fishing port

The purse seine based in Panimbang was originally a purse seine vessel from Indramayu. There are purse seine vessels in Panimbang and Sidamukti, but their registration is at Panimbang fishing port. The purse seine has existed and developed in Panimbang from 2001 until now. Currently, there are many purse seine vessels from Indramayu whose crews and owners are domiciled in Panimbang. The purse seine operated in Sunda Strait are non-resident fishermen, and their numbers are quite dominant in boat size and fishing gear. This purse seine is generally based in Panimbang (Banten Province) and Lempasing (Lampung Province) [12].

The purse seine vessels in Panimbang have a vessel size 30 GT with a net length of 1,000 m and width of 50 m, operated by 25-40 men, the number of crew can reach 50 during peak season. The length of the trip is 20 days every month and eight trips per year. The fishing ground is Sunda Strait waters to the southern Java Sea. The catch composition includes small pelagic fish mackerel tuna, mackerel, scads, yellow strip scad, and squid. The fishing ground of purse seine covers Peucang Island, Sumur, Tanjung Lesung, Taman Jaya, Panaitan, and Alang-Alang, where all the fishing grounds are directly adjacent to the waters of the Sunda Strait.

Sunda Strait is a potential fishing ground for various species, both pelagic and demersal [12]. The Sunda Strait waters are fertile because of the mixing of water masses from the Java Sea in the north and the Indian Ocean in the southern region [4]. The Sunda Strait waters are potential fishing ground throughout the year, both La Nina, regular, and El Nino conditions [13]. This condition is dynamic and positively impacts the productivity of capture fishery in the Pandeglang area [4]. The pelagic fish resources are relatively abundant, with production volume reached 28,452 tons in 2005 or 67% of the total production [14].

3.2. Financial feasibility of purse seine business

The feasibility of a purse seine fisheries business in Panimbang is calculated based on actual condition, where costs and revenues from the purse seine fishing gear are calculated based on the average value. Investment costs, fixed costs, variable costs, and revenues are presented in Table 1-4. The result of the feasibility analysis of purse seine fisheries business is presented in Table 5. The feasibility analysis result shows that financially the purse seine fisheries business in Panimbang is still feasible to continue to work on and still profitable to invest.

The investment cost of purse seine fisheries business includes a vessel, fishing gear, vessel engine, generator set, and lamp. The most significant investment cost is a vessel with
a value of IDR 1 billion and reaches 52% of the total investment cost. The second largest investment cost for fishing gear procurement (37%), as presented in Table 1. Meanwhile, the largest fixed cost component comes from the fishing unit's depreciation, which reaches 83%, as presented in Table 2. Investment capital is the foundation in building a business, including a fishing boat business. The amount of investment coast is adjusted to the target catch, location, fishing gear, and the crew's capacity for fishing gear operation [15]. The fixed costs on purse seine include ship maintenance, ship engine, fishing gear, additional equipment, and equipment [16].

**Table 1.** Investment costs in the purse seine fisheries business at Panimbang

| Investment cost components      | Amount ( IDR) | Proportion (%) |
|---------------------------------|---------------|----------------|
| Vessel 30 GT                    | 1,000,000,000 | 52             |
| Fishing gear                    | 700,000,000   | 37             |
| Vessel engine 120 HP            | 100,000,000   | 5              |
| Generator set 20,000 watt       | 85,000,000    | 4              |
| Lamp set 20 units               | 24,000,000    | 1              |
| **Total of investment costs**   | 1,909,000,000 | 100            |

**Table 2.** Fixed costs in the purse seine fisheries business at Panimbang

| Fixed costs components          | Amount ( IDR) | Proportion (%) |
|---------------------------------|---------------|----------------|
| Maintenance per year            | 52,500,000    | 16             |
| Depreciation per year           | 263,300,000   | 83             |
| Licensing per year              | 3,000,000     | 1              |
| **Total of fixed costs**        | 318,800,000   | 100            |

In the variable cost component, the largest proportion of purse seine fisheries cost is the crew's salary reached 72%. Operational cost per trips in peak season reach IDR 86,2 million and, in regular-season, reach 42,3%. This difference is because, during the peak season, diesel fuel and ice cube consumption are higher than during the regular season. Also, the average number of fishers is 40 people, up to 50 people. Meanwhile, during the regular season, there are only 25 people, as shown in Table 3.
Table 3. Variable costs in the purse seine fisheries business at Panimbang

| Variable costs component                                      | Amount (IDR) |
|---------------------------------------------------------------|--------------|
| **Operational costs**                                          |              |
| Peak season (2 months)                                         |              |
| Diesel fuel (4.000 liters per months x IDR 7.000 x 2 months)  | 56,000,000   |
| Lubricant (IDR 2 million per months x 2 months)               | 4,000,000    |
| Foodstuffs and freshwater (40 fishermen) (IDR 40 million per months x 2 months) | 80,000,000   |
| Ice cube (30 cubes x 20 days x IDR 27,000 x 2 months)         | 32,400,000   |
| **Total of operational costs at peak season (1)**             | 172,400,000  |
| Regular season (6 months)                                     |              |
| Diesel fuel (3.600 liters per months x IDR 7.000 x 6 months)  | 151,200,000  |
| Lubricant (IDR 2 million per months x 6 months)               | 12,000,000   |
| Foodstuffs and freshwater (25 fishermen) (IDR 25 million per month x 6 months) | 15,000,000   |
| Ice cube (15 cubes x 20 days x IDR 27,000 x 6 months)         | 81,000,000   |
| **Total of operational costs at regular season (2)**         | 259,200,000  |
| Retribution (3% per year) (3)                                  | 102,600,000  |
| The salary of the crew per year (4)                           | 1,368,000,00 |
| **Total of variable costs (1+2+3+4)**                         | 1,902,200,000|

The average revenue during the peak season is IDR 540 million, while during the regular season it is IDR 390 million, as shown in Table 4. Fishing business revenue is influenced by the amount of fish production and the price of fish commodities [17]. The amount of fish production in Sunda Strait is still influenced by the peak fishing season which lasts for 2 months (September-October), the regular fishing season for 6 months, and 4 months is the low season. This is influenced by factors of sea waves that do not support fishing operations. The fishing season in Sunda Strait is influenced by the monsoon winds [18].

Table 4. Revenue from purse seine fishery business at Panimbang

| Revenue component                                      | Amount (IDR) |
|--------------------------------------------------------|--------------|
| Peak season                                            |              |
| 1.8 tons per day x 20 days x 2 months x IDR 15,000     | 1,080,000,000|
| Regular season                                         |              |
| 1.3 tons per day x 20 days x 6 months x IDR 15,000     | 2,340,000,000|
| **Total of revenue**                                   | 3,420,000,000|

The revenue from the purse seine fisheries business is still higher than the investment cost. Although the profits obtained are still below the investment value, the business is still profitable. The value can see the feasibility criteria for a business R/C’s value, which is feasible if the value is > 1. The assessment the business is profitable can also be seen by the positive value of NPV, as shown in Table 5. If a business shows feasibility, it will rarely fail in implementation [19].
Table 5. The financial feasibility of purse seine at Panimbang

| Financial component                              | Amount          |
|-------------------------------------------------|-----------------|
| Investment cost ( IDR)                          | 1,909,000,000   |
| Total cost ( IDR)                               | 2,221,000,000   |
| Revenue ( IDR)                                  | 3,420,000,000   |
| Benefit/business profit ( IDR)                  | 1,199,000,000   |
| Revenue Cost Ratio (R/C)                        | 1,54            |
| Payback Period (PP)                             | 1 year 7 months 3 days |
| Net Present Value (NPV) ( IDR)                  | 3,007,136,726   |
| Net Benefit Cost Ratio (Net B/C)                | 2,58            |
| Internal Rate of Return (IRR) (%)               | 56,57           |

The feasibility of the fishing business requires the consideration of the length of investment return from the net profit (payback period). The payback period of purse seine in Panimbang for less than 2 years. The payback period of an investment can describe the length of time it takes for that is embedded in an investment to be fully recovered [20]. The value of Net B/C > 1 and the IRR > interest rate. This shows that the purse seine business in Panimbang has good prospects to continue to be developed.

The greater the B/C value, the greater the value of the benefit obtained from the business [21]. One of the most profitable fishing gear types is purse seine because its production is the highest compared to other fishing gear, the catch is high economic fish, and it has fast enough and provides profitable production [22].

4. Conclusion

The purse seine fisheries business based in Panimbang is still profitable and feasible to continue, considering the value of R/C > 1, the payback period less than 2 years, the positive value of NPV, Net B/C > 1, and IRR > interest rates.

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