



Feasibility study of functional facilities (ice factory) and level of need for ice supporting capture fisheries activities at PPI Meureudu

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ARTICLE INFO

Keywords:

Business Feasibility
Ice Block Facility
Pidie Jaya

ABSTRACT

Pidie Jaya Regency is one of the districts that contributes to capture fisheries production in Aceh Province. Pidie Jaya Harbor is the Fish Landing Base (PPI) in Meureudu. As capture fisheries activities developed at PPI Meureudu, the local government began to pay attention to building several port facilities such as basic facilities, functional facilities and supporting facilities. Supporting facilities or supporting facilities are facilities that support fishing activities at the port, one of these facilities is an ice factory. The ice factory at PPI Meureudu belongs to the Aceh marine and fisheries service which was built in 2012. The Aceh Development Fund (ADF) built an ice factory with a production capacity of up to 30 tons/day at the Meureudu Fish Landing Base (PPI), through an environmentally friendly technology program for industry fishing process. Under normal conditions, the PPI Meureudu ice factory is currently producing ice cubes in excess of fishermen's needs, so ice cubes are sold by fishermen operating in the Peulimbang and Peudada areas, Bireuen Regency. Sometimes, when the fish catch is abundant, ice is not enough to meet the ice needs for ships at PPI Meureudu and must be supplied from Sigli, Pidie Regency. This study aims to determine the need for ice in fishing and handling operations to the feasibility of the ice factory business at PPI Meureudu. This research was carried out for one month, namely in November 2022 at the Meureudu Fish Landing Base (PPI), Meureudu City, Kec. Meureudu, Pidie Jaya Regency. The data used in this study are primary data secondary data. using business feasibility analysis. The results showed that the need for ice blocks at PPI Meureudu for fishing operations within one month was 221.80 tons, and the need for ice for fish handling activities at PPI Meureudu within one month required the amount of ice to be 2,879 blocks of ice or 144,864 tons which is the result of the analysis financial value obtained from the NPV Rp. 95,761,105 can be said to be feasible because the value is greater than >0. At an IRR value of 5% it can be said to be feasible because the results of the IRR calculation are greater than the discount factor, and a Net B/C value of 1 is said to be a breakeven project because = 1. These three values have been carried out in the Meureudu PPI block ice factory business that business it is worth continuing.

DOI: 10.13170/depik.13.2.31496

Introduction

Fishery is one of the business fields that is expected to be able to improve the welfare of fishermen in Aceh. One of the sub-sectors in fisheries itself can play an important role in the recovery and growth of the Indonesian nation's economy because the potential for fish resources is large in number and variety (Rahmawati *et al.* 2013). The geographical location of the province of Aceh is at coordinates 20-60 North Latitude and 950-980

East Longitude, while the sea area of Aceh's waters is 295,370 km² consisting of 56,563 km² archipelagic waters and the Exclusive Economic Zone (EEZ) of 238,807 km² (Rizwan *et al.*, 2011). Fisheries management in Pidie Jaya Regency is carried out in 2 ways, namely capture fisheries and aquaculture. Capture fisheries products in Pidie Jaya Regency include tuna, tuna, anchovies, and others. Tuna is a superior product in Pidie Jaya Regency which is very large in size, so many fish entrepreneurs from North

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Sumatra come and buy directly from traditional fishermen on the coast of Pidie Jaya Regency (DKP Pidie Jaya, 2013). Capture fisheries is a business that has different characteristics from other businesses, because this business is full of challenges and is faced with risks and uncertainties (Aprilia 2019)

Fishery Ports have a strategic role in the development of fisheries and maritime affairs, namely as a center or center for marine fisheries activities. In addition to being a link between fishermen and users of their catch, both direct and indirect users such as: traders, processing factories, restaurants and others, it is also a place for the interaction of various interests of the coastal community located around the fishing port (Kusyanto, 2006).

Supporting facilities or supporting facilities are one that supports fishing activities at the port. One of these facilities is an ice factory. According to Ginting (2011), ice factory facilities are needed at every fishing port to support fishing activities because ice is used to maintain the freshness of fish after the fish are caught, during the landing process and in the process of transportation, storage and marketing. The production of block ice at this ice factory is 600 blocks per day with a weight of 50 kg per stick, while the ice requirement for ships during each fishing operation ranges from 5-250 ice blocks per trip with an average ship size of 10-58 GT. PPI Meureudu and fish traders use the ice produced for fishing operations and catch handling.

Research on ice factory facilities had been carried out previously by (Misjar, 2018), the results of this study found that the need for ice at PPI Sawang Ba'u within one month was 9,492 blocks or 189.84 tons. The need for supplies for fishing boats is 354 blocks or 17.7 tons per day, and the need for ice for fish handling activities at PPI Sawang Ba'u is 32 blocks or 1.6 tons per day. It is feasible to build an ice factory with a production capacity of 386-500 blocks of ice per day. The normal condition of the PPI Meureudu ice factory at the moment is that those who produce ice cubes exceed the needs of fishermen, so that the ice cubes sold by fishermen operate outside the area. Sometimes, in conditions where the fishermen's catches are abundant, ice is not enough to meet the ice needs for ships at PPI Meureudu and must be supplied from Sigli, Pidie Regency. Therefore the author wants to examine more deeply the amount of ice needed for the smooth running of capture fisheries activities at PPI Meureudu. Business analysis is used to find out whether the fishing business is feasible or not (profitable/disadvantageous). the profits obtained in

a business can be a parameter for the success of a business (Harahap 2019). Therefore, research is needed related to business feasibility analysis of purse seine boat business with the aim of knowing whether business on purse seine ship is a feasible business to run in fishing business.

Materials and Methods

Location and time of research

This research was carried out for one month, namely in November 2022 at the Meureudu Fish Landing Base (PPI), Meureudu City, Kec. Meureudu, Pidie Jaya Regency. A tools and materials used in this study such as stationery, laptops and questionnaire sheets (28 sheets). The data used in this study are primary data secondary data. Primary data was obtained from interviews with respondents consisting of 26 fishermen and 1 owner of an ice factory. Meanwhile, secondary data was obtained from the Maritime Affairs and Fisheries Office of Pidie Jaya Regency, books, journals and other publication.

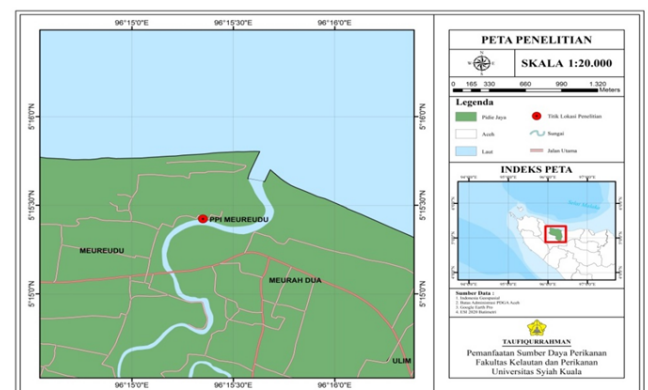


Figure 1. Maps of the Meurudu PPI research location shown in the red dot area.

Data analysis

The analytical method used in this research is business feasibility analysis. Analysis of the feasibility of a fishing business is important to analyze so that its performance and level of support for fishermen's welfare can be identified, including when production tends to decline. Analysis of the feasibility of the ice factory business at PPI Meureudu was carried out using the Net Present Value (NPV), Net Benefit Cost Ratio (Net B/C) and Internal Rate of Return (IRR) approaches.

1. Net Present Value (NPV)

Mathematically it can be seen in the formula below as follows:

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

Information:

B_t = Benefit (profit) in year t

C_t = Cost (cost) in the t-year

t = Time Period or t-th year

i = prevailing interest rate

n = Length of time period

The criteria for accepting and rejecting an investment plan using the NPV method are as follows:

- 1) If the NPV > 0, then the project proposal is accepted,
- 2) If the NPV < 0, then the project proposal is rejected, and
- 3) If NPV = 0, the probability that the project will be accepted or value the company remains even if the project proposal is accepted or rejected (Cholihq et al., 1999).

2. Net benefit Cost Ratio (Net B/C)

Mathematically it can be seen in the formula below as follows:

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

B_t = Benefit (profit) in year t

C_t = (Cost) cost in year t

t = Time Period or t-th year

i = prevailing interest rate

n = Length of time period

With decision criteria:

- 1) Net B/C > 1 The project is said to be feasible
- 2) Net B/C < 1 The project is said to be not feasible
- 3) Net B/C = 1 So, the business loses so it is not feasible to run (Cholihq et al., 1999)

3. Internal Rate of Return (IRR)

Internal rate of return (IRR) is the maximum interest rate (discount rate) until the NPV value = 0, so it is in a profit and loss limit. Fishery activities are feasible to be developed if they have an IRR value > the prevailing bank interest rate (Kadariah et al., 1999).

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

Information :

NPV1 = NPV which is positive

NPV2 = NPV which is negative

i₁ = The interest rate when the NPV is positive

i₂ = The interest rate when the NPV is negative

A viable business project attempted if IRR > prevailing bank interest (Cholihq et al., 1999).

Results

1. The Need for Ice at PPI Meurudu

A. The need for ice for fishing operations at PPI Meureudu

Meuruedu Fish Landing Base (PPI), for fishing activities it really needs block ice and needs block ice to extending the shelf life of fishermen's catches during the fishing process at sea (Table 1).

Table 1. The amount of ice needed for fishing operations

No	Size (Gt)	Ice Amount/Month (Tons)	Number of trips/month	Total Ice Needs/Month (Tons)
1	58	7.50	2	15
2	50	3.00	1	3
3	50	7.50	3	22.5
4	50	15.5	2	12
5	48	4.50	3	13.5
6	44	7.50	2	15
7	38	6.25	2	12.5
8	36	3.25	3	9.75
9	30	6.00	5	30
10	25	3.25	1	3.25
11	23	2.50	1	2.5
12	20	3.25	2	6.5
13	15	3.50	2	7
14	15	3.50	2	7
15	15	3.25	1	3.25
16	15	3.50	1	3.5
17	15	4.00	1	4
18	15	3.50	2	7
19	15	3.50	2	7
20	14	2.50	1	2.5
21	13	1.75	1	1.75
22	11	0.90	2	1.8
23	10	1.00	1	1
24	10	1.25	2	2.5
25	6	1.50	3	4.5
26	5	1.50	2	3
27	5	1.50	1	1.5
Amount				221.80 tons

B. The need for ice for handling operations at PPI Meureudu

The handling of fish at PPI uses ice cubes that have been crushed using an ice crusher, the ratio of using ice to fish is 1:1 (1 kg of fish, 1 kg of ice). According to Deni (2015), a good ratio to extend the freshness of fish is 1: 1 (1 kg of ice is used to cool 1 kg of fish). The amount of ice needed in one month is 144,864 tons (Table 2).

Table 2. The amount of ice needed for handling fish at PPI Meurueudu

No	Ship name	Number of fish kg	The amount of ice cubes needed	Amount of ice needed (kg)
1	KM. Putri Len	11100	222	11100
2	KM. Asai Mula 86	11100	222	11100
3	KM. Kuala Pijay	10,166	203	10,166
4	KM. Putra Pijay	12,000	240	12,000
5	KM Putri Leen	6,750	135	6,750
6	KM. Putra Pijay	11,350	227	11,350
7	KM. Sepakat Baroe	12,000	240	12,000
8	KM. Raisa	7,700	154	7,700
9	KM. Ramadhan	5,770	115	5,770
10	KM. Ata Droec	3,160	63	3,160
11	KM. Jasa Bintang	3,500	70	3,500
12	KM. Samdoria	4,850	97	4,850
13	KM. Aneuk Agam	3,910	78	3,910
14	KM. Enjoy	2,560	51	2,560
15	KM. Mita Bu	3,960	79	3,960
16	KM. Asyifa	3,360	67	3,360
17	KM. Thufail	1,420	28	1,420
18	KM. Naifa	3,620	72	3,620
19	KM. New Mercedes	4,750	95	4,750
20	KM. Rakan 02	3,680	74	3,680
21	KM. yusha	3,400	68	3,400
22	KM. Boh hate	6,100	122	6,100
23	KM. Oen Mirah	1,600	32	1,600
24	KM. Na Masok	2,608	52	2,608
25	KM. Enjoy	1,800	36	1,800
26	KM. Jasa Baru	1,150	23	1,150
27	KM. Reja	1,500	30	1,500
Amount		144,864 kg	2,897	144,864 kg

2. The financial feasibility of an ice factory business

The results showed that the ice factory had met the demand for ice for fishing operations and fish supplies at TPI (Table 3).

Table 3. Investment Costs

No	Investment type	Amount	Price
1	Ice cube mold	600 units	Rp. 270,000,000
2	Engine (Maicom)	2 units	Rp. 1,060,000,000
3	Cooling dynamo	3 units	Rp. 300,000,000
4	Operational car	3 units	Rp. 350,000,000
Amount			Rp. 1,980,000,000

Investment costs are costs incurred to acquire fixed assets will be used by the company to carry out its business activities. Based on Table 3 above, the investment costs incurred by the ice factory amounted to Rp. 1,980,000,000 for initial capital.

Table 4. Investment Costs

No	Variable costs	Price
1	BBM	Rp. 48,000,000
2	Oil	Rp. 10,000,000
3	Salt	Rp. 18,000,000
4	Electricity	Rp. 600,000,000
5	Employee salary	Rp. 177,600,000
6	Ammonia	Rp. 12,000,000
7	Operational car oil	Rp. 9,000,000
Amonut		Rp. 874,600,000

Variable costs are costs that change proportionately depending on the production spent. Variable costs whose amount varies according to the amount of production produced. Based on Table 4 the costs incurred by the ice factory are Rp. 874,600,000 per year.

Table 5. Investment Coast

No	Fixed cost	Price
1	Maintenance	IDR 24,000,000
Amount		IDR 24,000,000

Fixed costs are costs that are always fixed overall regardless of activity level. These costs must always be paid by companies or business actors, even if they do not produce output of goods or services. Based on Table 5, the maintenance costs incurred by the factory are Rp. 24,000,000 per year.

Table 6. Business Feasibility Value

No	Description	Mark	Category
1	Net Present Value (NPV) 3.72%	Rp. 95761105	Worthy
2	Internal Rate of Return (IRR)	5%	Worthy
3	Net Benefit/ Cost (NB/C)	1	Balanced

The value of the Net Benefit Cost Ratio (Net B/C) is obtained from a comparison between the total Net Present Value which is positive and the Net Present Value which is negative. Based on table 6. Net Present Value (NPV) with an interest rate of 3.72%, the NPV value is Rp. 95,761,105, the Internal Rate of Return (IRR) obtained by the business is 5%, the Net Benefit/Cost (NB/C) value obtained is 1 (Table 6).

Discussion.

1. Meureudu PPI Ice Needs

Fishing operations for each ship at PPI Meureudu take 1 to 14 days, but on average fishing operations are carried out for 4 to 6 days. The ship at PPI Meureudu made 4 fishing trips within 1 month.

According to Yunanda et al (2018), the provision of ice for the needs of fishing operations is one of the services that has an important role in fishing ports, this is because ice is very much needed for the continuity of production and handling the quality of fishery products. Ships carrying out fishing operations at PPI Meureudu need ice for handling fish on board, for an average number of vessels per day carrying out fishing activities ranging from 3 to 4 units of vessels. The need for ice blocks needed for 3-4 ships ranges from 150-500 ice blocks. Based on this amount, it can be concluded that the ice factory has met the need for block ice for ships operating at PPI Meureudu.

2. The need for ice for handling fish at PPI Meureudu.

Fish are animals that decompose very quickly if left to die without handling. To reduce the risk of damage and quality of fish, fish must be handled properly and correctly. One of them is using ice as a cooling medium to maintain the quality of fish to keep it fresh Misjar et al (2018). Fish handling at PPI Meureudu within one month the amount of ice needed is 2,897 blocks of ice or 144,864 tons. The availability of ice blocks for fish handling needs is said to be sufficient, the ice factory can produce as much as 18,000 blocks of ice in 1 month. The need for ice for fish handling activities at PPI Sawang Ba'u is 32 blocks or 1.6 tons per day. It is feasible to build an ice factory with a production capacity of 386-500 blocks of ice per day (Misjar et al., 2018).

3. The financial feasibility of an ice factory business.

Financial feasibility analysis aims to determine whether a business is feasible or not. The analysis is part of business planning. According to Khotimah (2014), Investment costs are initial costs incurred when running a business, namely in the first year of business, where the amount is relatively large and cannot be used up in one production period. Errors in determining production technology assumptions, raw material availability and price fluctuations, operational cost sensitivity, labor estimates can lead to inaccurate analysis so that if the plan is realized it has the potential to cause losses (Kusuma and Nur, 2014).

According to Ningsih et al (2014), Cost is a component of expenditure that must be incurred. Fishing business costs are divided into two, namely fixed costs and variable costs. According to Assegaf (2019) fixed costs are costs that are incurred periodically and the amount is always constant or

fixed, not affected by the size of the business volume or business processes that occur in that period. The following is in Table 6 the fixed costs incurred by the ice factory business at PPI Meureudu in the form of maintenance costs incurred every 1 month with a budget of Rp. 2,000,000 per month so that the costs incurred are Rp. 24,000,000 per year. Meanwhile, variable costs are in the form of ice factory operational costs such as fuel oil (BBM), engine oil, salt, electricity, employee salaries, ammunition, and operational car oil. based on table 8 the costs are not fixed (variable), namely the costs incurred are Rp. 874,600,000 per year, in the 4th year the ice factory will replace a new machine at a price of Rp. 550,000,000. According to Saleh (2018), variable costs are one of the biggest costs incurred by companies, because variable costs are directly related to the production costs of a company.

1) NPV parameters.

The NPV parameter is used to determine the business feasibility of an ice cube production factory based on the difference between the present value of receipts and the present value of expenses at a certain interest rate that applies while the factory is still in operation. The interest rate used is 3.72%, the resulting NPV value while the factory is in operation is IDR 95,761,105. NPV determination is carried out by experimenting with several interest rates, at an interest rate of 4% the NPV value is Rp. 79,845,018. If the interest rate is 7%, then the NPV value obtained is -Rp. 78,855,996 in the NPV value indicates a negative NPV value. Judging from these interest rates, the ice block factory is still profitable at an interest rate of 4% and will lose at an interest rate of 7%. in research conducted by misjar et. al (2018) the interest rate used is 12%, the NPV value while the factory is operating is IDR 923,124,673, at an interest rate of 25% the NPV value obtained is IDR 153,725,693, the NPV value is still positive, p. This shows that the factory business is feasible. according to Wismaningrum et al (2013) a business is worth continuing if it has an NPV value that is greater than the discount factor value.

2) Internal rate of return (IRR).

Internal rate of return (IRR) is the discount rate that causes the NPV of investment to be zero, by examining the IRR, namely the rate of return that produces an NPV equal to 0 Wismaningrum et al (2013). Ice factory business has an IRR value of 5%, the discount factor used in this study is 4.25%. If the result of the IRR calculation is greater than the discount factor, it is said that the business is feasible

to continue, if it is equal to the discount factor, it means the return is principal and is below the discount factor, the project cannot be continued (Wismaningrum *et al.*, 2013).

3) B/C value.

Based on the analysis carried out, the B/C value is 1, so the business is feasible or can be implemented. According to Wismaningrum *et al.* (2013), if the B/C ratio is equal to 1, then the project breaks even between costs and benefits so it is up to the decision maker whether to implement it or not. If the B/C ratio is less than 1, then the business is not feasible or cannot be implemented.

Conclusion

The conclusions obtained in this study are The need for ice blocks at PPI Meureudu for fishing operations within one month is 221.80 tons, and the need for ice for fish handling activities at PPI Meureudu within one month the total need for ice is 2,879 blocks of ice or 144,864 tons, and 2. Based on the Financial Analysis that has been carried out by the ice block factory business in Meureudu ppi, it shows that the value generated by the category is feasible to continue. The value of the NPV 95,761,105 can be said to be feasible because the value is >0. At an IRR value of 5% it can be said that it is feasible because the results of the IRR calculation are greater than the discount factor, and the Net B/C value is 1. It is also said that the project breaks even between costs and benefits so it is up to the decision maker to implement it or not because = 1. Third This value has been carried out in the PPI Meureudu ice block factory business that this business is feasible to continue.

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Agustina, I., R.M. Aprilla, T. Rizwan, C. Chaliluddin, S. Salmarika, A. Rahmah, R.W. Fuah. Feasibility study of functional facilities (ice factory) and level of need for ice supporting capture fisheries activities at PPI Meureudu. *Depik Jurnal Ilmu-Ilmu Perairan, Pesisir dan Perikanan*, 13(2): 363-368.