The business study of shark fishing with bottom longline in Kutaraja Fishing Port of Banda Aceh, Indonesia

M A Chaliluddin, 1*, D Rianjuanda1, R M Aprilla1, L Afriani1, R Fachruddin2

1Department of Fisheries Resource Utilization, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh, Indonesia
2Department of Accounting, Faculty of Economic and Business, Syiah Kuala University, Banda Aceh, Indonesia

*E-mail: chaliluddin@unsyiah.ac.id

Abstract. Kutaraja Fishing Port is the largest fishing port in Aceh Province located in Lampulo, Banda Aceh. Shark fishing in Aceh is very beneficial for fishermen from the economic aspect. There are four fishing shark fleets that actively land their catches at Kutaraja Fishing Port, the fishing gear used is bottom longline with 5 and 6 GT vessels. The study was conducted from November to December 2017 which aims to determine the feasibility of catching shark business with bottom longline fishing gear at Kutaraja Fishing Port. The results of the business feasibility analysis on the four vessels operating in Kutaraja Fishing Port, Monek II with NPV value of US$ 13,534.95 (US$=IDR 13000) IRR of 25.39%, and net B/C ratio of 2.07, Rizki the NPV value was US$ 5,532.42, IRR is 15.35% and net B/C ratio is 1.45, Monek I the NPV value is US$ 10,290.80, IRR is 17.59% and B/C ratio is 2.10, and Bungber's 02 NPV value amounting to US$ 11,104.21, IRR of 30.36% and net B/C ratio of 2.31. Discount factor used is 4.75%. Based on the calculation of NPV, net B/C ratio, and IRR, the business of catching sharks with bottom longlines in Kutaraja Fishing Port is profitable and deserves to be continued.

1. Introduction

Kutaraja Fishing Port is the largest fishing port in Aceh Province. The condition of the Kutaraja Fishing Port which is in the international shipping lane makes it a very strategic place for economic activities including capture fisheries products. Capture fisheries are one of the activities that is based on the economy by collecting, capturing and utilizing fish resources in waters that are not cultivated [1].

The promising shark fishing business in our country makes the value of shark production in Indonesia continue to increase from year to year. In 1987, shark fishery production in Indonesia was recorded at 36,884 tons, then in 2000, the production of sharks increased almost to double, amounting to 68,336 tons [2]. The shark fishing business in Aceh seen from the economic aspect turned out to be very profitable for the fishermen [3]. Kutaraja Fishing Port is a fishing port that is active in carrying out shark landing activities in Aceh. This shark fishing also follows the values of local wisdom that apply in Aceh [4] [5].

Shark products consist of meat, cartilage, skin, teeth, jaw, stomach contents, liver and fins. Shark fin is the part that has the highest economic value because this part is used as an ingredient in making soup with the price of one portion can reach US$ 38.46 [6].
The fishing gear that is often used to catch sharks is bottom longline. The bottom longline shark is a fishing gear that consists of many fishing rods which are carried out at the bottom of the waters and focus on catching sharks which are used for their liver oil / squealing [7] [6]. Indonesia is declared the largest producer of sharks in the world [8], but that is only a general description, while specifically, we rarely find data or information about shark fishing efforts in Indonesia, especially in Aceh, there is almost nothing. On this basis the authors are interested in conducting research on the study of shark fishing business with a bottom longline whose landing was carried out at Kutaraja Fishing Port, Banda Aceh. The purpose of this study was to determine the feasibility of catching shark businesses based on economic aspects at Kutaraja Fishing Port, Banda Aceh.

2. Materials and Methods
2.1 Site and time
Time and place of research. This research was conducted for two months, from October 16, 2017 to November 16, 2017 at the Kutaraja Fishing Port, Lampulo, of Banda Aceh (Figure 1).

Figure 1. Research sites

2.2 Data collection
The method used in this study is the survey method, which is direct observation of seeing the catch of sharks landed at the Kutaraja Fishing Port, Banda Aceh. The data used in this study consisted of primary and secondary data. Primary data were collected from respondents using the help of a questionnaire prepared previously. Primary data collected includes; investment costs, sales prices (including sales of shark meat, shark fins and shark liver oil), variable costs, and fixed costs, then secondary data is data related to shark fishing with bottom longline, both in the form of catch data, results of research on sharks, and journals.

2.3 Data analysis
The collected data is then analyzed using business feasibility analysis [9]. The analysis is to measure whether the business is feasible to continue based on economic aspects. The calculation of the feasibility of shark fishing business is measured through the calculation of Net Present Value (NPV), Benefit Cost of Ratio (BCR), Internal Rate of Return (IRR). Here's a brief explanation and how to calculate it:

1. NPV (Net Present Value)
The NPV of a project is the present value of the difference between benefits and cost at a certain discount rate. By using the formula, as follows:
\[ NPV = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} \]  
where: \( B_t = \) Benefit in year \( t \); \( C_t = \) cost in year \( t \); \( i = \) discount rate; \( t = \) period; \( n = \) The economic life of the project.

The criteria: If NPV > 0, then the investment is feasible because it is profitable; If NPV < 0, then the investment is not feasible because it has suffered a loss.

2. Net Benefit - Cost Ratio (BCR)

Net Benefit - Cost Ratio is a comparison between the value between the sale of the product and the production cost:

\[ \text{Net BCR} = \frac{\text{The sale of the product}}{\text{The production cost}} \]  

Criteria: If the Net BCR ratio > 1, then the investment is feasible and provides benefits. If the Net BCR ratio is <1, then the investment is not feasible because of a loss.

3. Internal Rate of Return (IRR)

IRR is an investment criterion to determine the percentage of profit from a project each year and the IRR is also a measure of the ability of a project to repay loan interest.

\[ IRR = i_1 + \frac{\text{NPV}_1 - \text{NPV}_2}{\text{NPV}_1} (i_1 - i_2) \]  
where: \( \text{NPV}_1 = \) NPV which is still positive; \( \text{NPV}_2 = \) negative NPV; \( i_1 = \) Discount rate which still gives positive NPV; \( i_2 = \) Discount rate that gives a negative NPV

3. Results and Discussion

Investation. The shark fishing business with bottom longline, which landed its catch at Kutaraja Fishing Port of Banda Aceh, during the study there were 4 four-vessel units, namely; Monek II, Rizki, Monek I, and Bungber's 02. In analyzing the feasibility of fishing business with bottom longlines there are several costs assessed, namely investment costs, variable costs and fixed costs, and the sale price of the catch. These costs will be described as follows:

Investment costs. Investment costs are the initial costs incurred for doing business [10]. Investment is the main component in launching the production process to produce as much profit as possible [11]. The investment costs of the shark fishing business unit with the basic longline that landed their catch at the Kutaraja Fishing Port of Banda Aceh are very different. investment consists of ship prices, machine prices and the price of fishing gear. The investment costs of each vessel are; Monek II is US$12,692.31, Rizki amounted to US$12,307.69, Monek I amounted to US$9,384.62 and Bungber's US$8,461.54.

Fixed cost. is business expenses that do not depend on the level of goods or services produced by the business. The fixed costs incurred by shark fishing units with bottom longline are maintenance costs (fishing vessel, machinery and fishing gear) and depreciation costs of fishing vessels and machinery. The fixed costs incurred by each arrest unit each year are; Monek II is US$3,623.08, Rizki for US$3,450.00, Monek I is US$2,820.00 and Bungber's Rp. 2,757.69.

Variable cost. Non-fixed costs are the opposite of fixed costs, these non-fixed costs are dynamic. He follows the number of units produced or the number of activities carried out. At this cost, the amount we will spend per unit or per activity is actually a fixed amount while for the total cost the amount will adjust to the number of units produced or the number of activities carried out [11] [10]. Non-fixed costs incurred for shark fishing units with bottom longline consist of food costs, ice purchases, and fuel purchase costs for a year. The irregular costs of each shark fishing unit are as follows; Monek II is US$321.15, Rizki amounted to US$325.00, Monek I amounted to US$323.08 and Bungber's is US$259.62. More is presented in Table 1 below.
Table 1. Costs of business of catching sharks with bottom longline at Kutaraja Fisheries Port, Banda Aceh.

| No | Cost                | Sharks fishing expenses (US$/Unit) |
|----|---------------------|------------------------------------|
|    |                     | Monek II               | Rizki                   | Monek I               | Bungber's 02             |
| A  | Investation         | 9,230.77               | 9,230.77               | 6,153.85              | 5,769.23                |
|    | - Vessel            | 9,230.77               | 9,230.77               | 6,153.85              | 5,769.23                |
|    | - Engine            | 1,923.08               | 1,923.08               | 2,461.54              | 1,538.46                |
|    | - Bottom longline   | 1,538.46               | 1,153.85               | 769.23                | 1,153.85                |
|    | Total A             | 12,692.31              | 12,307.69              | 9,384.62              | 8,461.54                |
| B  | Fix Cost            | 923.08                 | 923.08                 | 923.08                | 923.08                  |
|    | - Maintenance       | 2,700.00               | 2,526.92               | 1,896.92              | 1,834.62                |
|    | Total B             | 3,623.08               | 3,450.00               | 2,820.00              | 2,757.69                |
| C  | Variable Cost       | 76.92                  | 92.31                  | 76.92                 | 76.92                   |
|    | - Ransum            | 96.15                  | 105.77                 | 76.92                 | 76.92                   |
|    | - Ice Cube          | 148.08                 | 126.92                 | 169.23                | 105.77                  |
|    | Total C             | 321.15                 | 325.00                 | 323.08                | 259.62                  |
|    | Total A+B+C         | 16,636.54              | 16,082.69              | 12,527.85             | 11,478.85               |

Income is the amount of money received by the company from its activities, mostly from the sale of products and / or services to customers. For investors, income is less important than profit, which is the amount of money received after deducting expenses. Income is the amount of money received by the company from its activities, mostly from the sale of products / services to customers. For investors, income is less important than profit, which is the amount of money received after deducting expenses.

The amount and sale value of shark catches at Kutaraja Fishing Port of Banda Aceh consists of meat, fins and shark oil. For more details about the catch of sharks from the four vessels catching sharks with bottom longlines at Kutaraja Fishing Port of Banda Aceh, see the following Table 2.

Table 2. Production of the Shark / year catches based on individual numbers and selling points

| No | Komodity    | Monek II | Rizki | Monek I | Bungber's 02 |
|----|-------------|----------|-------|---------|--------------|
|    | Kg/y        | US$/y    | Kg/y  | US$/y   | Kg/y         | US$/y      |
| 1  | Shark meat  | 19,200   | 29,538.46 | 20,160 | 31,015.38 | 14,400     | 22,153.85 | 13,440     | 20,676.92 |
| 2  | Shark fin   | 96       | 2,584.62   | 168   | 4,523.08  | 100.8      | 2,713.85  | 84         | 2,261.54  |
| 3  | Shark oil   | 192      | 1,772.31   | 252   | 2,326.15  | 144        | 1,329.23  | 67.2       | 1,550.77  |
|    | Total       | 33,895.38| 37,864.62 | 26,196.92 |             | 24,489.23 |

Based on Table 2. The production of the catch of sharks from the four fishing vessels using a bottom longline fishing gear for 1 year, the Monek II vessel received a total catch of US$ 33,895.38 Rizki got a total catch totaling US$ 37,864.62. Monek I received a total catch of 26,196.92. Then Bungber's 02 gets a total catch of US$ 24,489.23.

The investment value is the main indication in the scale of the fisheries business carried out by coastal communities, if the vessels, fishing gear and supporting equipment can be cultivated in full, the fisheries business has developed in the middle to upper scale. The type of investment invested in the business of catching sharks with bottom longline, is vessels with a size of 5-6 GT made of receipt wood. meudang type of wood and others having a length of ± 22 m and within ± 2.5 m. The shark longline vessels consist mainly of wooden vessels measuring around 14-15 meters in length, and 1 m high using two powered propulsion engines each around 25-30 horsepower [12]. The vessel is driven by machine the Yang Dong brand and the Fuso brand is 120 PK and has diesel fuel. Fuel is the main operational requirement of fishermen in the waters north of Aceh. The fishing gear used is the bottom
longlines with a length of 1000 m and there are 1500 fishing rods [13]. Shark bottom longlines has an overall main rope between 900-1000 m with a series of branch ropes divided into one unit called basket [14].

Investment criteria consist of Net Present Value criteria is the present value of the difference between benefits and cost at a certain discount rate. Internal Rate of Return is an investment criterion to find out the percentage of profits from a project each year, and Net Benefit Cost Ratio is a comparison between the value between sales results and production costs can be seen in table 3 below.

Table 3. Investment value of business of shark fishing based on NPV, IRR, and net B - C Ratio analysis

| No | Kriteria | KM Monek II | KM Rizki | KM Monek I | KM Bungber’s 02 |
|----|----------|-------------|----------|------------|-----------------|
| 1  | NPV      | 4,75%       | 4,75%    | 4,75%      | 4,75%           |
|    |          | US$ 13,533.95 | US$ 5,532.42 | US$ 10,290.80 | US$ 11,104.21  |
| 2  | NPV₂     | 25%         | 15%      | 15%        | 25%             |
|    |          | US$ 703.39  | US$ 588.19 | US$ 4,910.84 | US$ 389.14      |
| 3  | NPV₂     | 30%         | 20%      | 20%        | 30%             |
|    |          | US$ -1,078.80 | US$ -1,092.74 | US$ -3,016.74 | US$ -697.59     |
| 4  | IRR      | 25,39%      | 15,35%   | 17,59%     | 30,36%          |
| 5  | Net B C Ratio | 2,07 | 1,45 | 2,10 | 2,31 |

Based on Table 3 investment criteria. Internal Rate of Return Monek II got a value of 25.39%, the value indicates that the IRR is greater than the discount factor of 25%, meaning that the business of catching sharks fishing with bottom longline is declared to be feasible to go. Furthermore, Net Benefit-Cost Ratio of Monek II gets a value of 2.07, then the business of sharks fishing with bottom longline is continued because the value is greater than 1, meaning that every US$ 1 invested in the business will be returned at US$ 2.07.

Rizki. The Internal Rate of Return of 15.35% indicates that the IRR is greater than the 15% discount factor, which means that the effort to catch sharks using the baseline is said to be feasible to continue. Furthermore, the Net Benefit-Cost Ratio gets a value of 1.45, then the business of sharks catching with bottom longlines is feasible to continue because the Net B / C ratio is greater than 1, meaning that every US$ 1 invested will return to US$ 1.45.

Monek I. The Internal Rate of Return gets a value of 17,59%, the value indicates that the IRR is greater than the 15% discount factor, which means that the effort to catch sharks using the baseline is said to be feasible to continue. Furthermore, the Net Benefit-Cost Ratio gets a value of 2,10. Then the business of shark fishing with bottom longlines is feasible to continue because the Net B/C ratio is greater than 1, meaning that every US$ 1 invested in the business will return US$ 2,10.

Bungber’s 02. The Internal Rate of Return gets a value of 30,36%, the value indicates that the IRR is greater than the 25% discount factor, which means that the effort to catch sharks using the baseline is said to be feasible to continue. Furthermore, the Net Benefit-Cost Ratio gets a value of 2,31. Then the business of shark fishing with bottom longlines is feasible to continue because the Net B-C ratio is greater than 1, meaning that every US$ 1 invested in the business will return US$ 2,31.

4. Conclusion
The results of the study analysis of the business of sharks fishing with bottom longline at Kutaraja Fishing Port of Banda Aceh, it can be concluded that the efforts to shark fishing using bottom longline is very profitable and deserve to be continued.
Acknowledgement

Thank you, we say to the Aceh of Panglima Laot, Lampulo of Panglima Laot, Fishing Master Fachruddin, Fishing Master Niswar, Fishing Master Nasrol and Fishing Master Khairuddin, and friends who have helped.

References

[1] Statistics of Banda Aceh. Banda Aceh City in figures 2016 Statistics of Banda Aceh City. Banda Aceh
[2] Dharmadi dan Fahmi 2003 Fisheries characteristic of artisanal sharks and rays in Indonesian waters. In: Proceeding of the Seminar on Marine and Fisheries Jakarta, 15-16 December 2002. Agency for Marine and Fisheries Research, MMAF. p.122129.
[3] Munawir 2016 Identification of types and seasons of shark fishing in Lampulo fishing port. Department of Fisheries Resource Utilization, Fisheries of Faculty, Abulyatama University, Aceh Besar District, Indonesia
[4] Chaliluddin, Purbayanto A, Monintja D R, Imron M, Santoso J 2014 Institution of Panglima Laôt in Supporting Sustainable Capture Fisheries Based on Local Wisdom in Aceh Jaya District. International Journal of Sciences: Basic and Applied Research. 16(2): 147-163
[5] Chaliluddin, Purbayanto A, Monintja D R, Imron M, Santoso J 2015 Role of Local Wisdom in Utilization of Resource of Fish in The Aceh Jaya District, Indonesia. International Journal of Engineering, Management &Sciences 2(3): 3 - 6
[6] Fahmi and Dharmadi 2013 An overview of the status of shark fisheries and conservation efforts in Indonesia. Directorate of Area and Fish Species Conservation, Directorate General of Marine, Coastal and Small Islands. Jakarta
[7] Dharmadi, Fahmi and White W 2009 Biodiversity of Sharks and Rays in South - Eastern Indonesia. Indonesian Fisheries Research Journal 15(1): 17-28
[8] Lack M, and Sant G 2009 Trends in Global Shark Catch and Recent Developments in Management. Published by TRAFFIC International, Cambridge, UK.
[9] Kadariah, Karlina L, Gray C 1999 Introduction to project evaluation. Research institute of the Faculty of Economics, University of Indonesia. Jakarta.
[10] Neliyana, Wirayawan B, Wiyono ES, Nurani T W 2015 Analysis Financial Fisheries of Purse Seine in Lampulo Fishing Port Banda Aceh Provinsi Aceh. Marine Fisheries. 5(2): 163-169
[11] Budiman R, Wijayanto D, Asriyanto 2014 Analisis finansial usaha perikanan tangkap pancing ulur (Handline) di Pangkalan Pendaratan Ikan Jayanti, Kabupaten Cianjur. Journal of Fisheries Resources Utilization Management and Technology 3(3): 44 - 52
[12] Sudirman, H. and Mallawa A 2012 Fishing techniques. PT Rineka Cipta. Jakarta.
[13] Raihanah, Wisudo S H, Baskoro M S, Sutisna D H 2011 Financial Feasibility of Developing Small Pelagic Fisheries in North Nanggroe Aceh Darussalam Waters. Pascasarjana IPB Journal XIX (1): 53-67.
[14] Subani W, and Barus H R 1989 Fishing gears and shrimp fishing equipment in Indonesia. Journal of Marine Fisheries Research No 50 BPPL – BPPP. Agriculture Department. Jakarta