



## **Squids Fishing (*Stenoteuthis oualaniensis*) as the Main Livelihood of Motto Village Citizens, North Lembeh, Bitung City**

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### **Abstract**

Squid fishing by Motto Village fishermen is a hereditary cultural fishing and has been going on for a long time. The research on squid fishing of Motto village is essential to know how squid harvested and captured. The purpose of this study was to identify squid fishing in the waters of the Motto Village. The method used in this research is a descriptive research method. The research was conducted during September - November 2021. Data was collected through observation and interviews. The results obtained that squid fishing is one day fishing in their traditional fishing ground. Fishermen in good weather do fishing operation 20-25 times of fishing trip monthly. This squid fishing activity in Motto waters is still profitable. There are two marketing flow of squid in the Motto waters. The squid is sold to market trader/factory or to traditional market. The added value product of squid of Motto needs to be suggested and implemented for their new income, this has not been done by community.

**Keywords:** *Stenoteuthis oualaniensis*, Motto Village, marketing flow, collecting trader, market trader

### **1. INTRODUCTION**

Capturing fisheries is the activity of producing fish by capturing both inland fisheries or marine fisheries and not cultivated. Fisheries consist of fish resources and non-fish resources. One of these non-fish resources is squid. The potential and benefits of squid in Indonesia are pretty significant, including in North Sulawesi [1], [2]. Specifically, for Bitung City, the potential of squid is relatively high. This is illustrated in the catch data of squid (*Stenoteuthis oualaniensis*) landed at PPS Bitung during the period 2016 to 2022 which are respectively: 27,179 tons, 53,588 tons, 161,998 tons, 313,488 tons, 128,502 tons, 98,591 tons, 110,796 tons (PPS Bitung, 2023).

Existing data shows that Bitung city is the most significant contributor to total squid production in North Sulawesi province. Squid catches are supported by the number of fishing households in North Sulawesi and Bitung City. There are 22,422 fishing households in North Sulawesi catch soft-skinned animals (squid). The number of fishing households catching soft-skinned animals (squid) is 2,407 fishing households (<https://sulut.bps.go.id/indikator/56/112/1/jumlah-rumah-tangga-perikananangkap-.html>).

The waters of Bitung City have the potential for abundant squid resources, especially in the waters of Motto Village, North Lembeh Subdistrict. The characteristics of squid fishers in Motto Village are traditional fishers who catch squid with the aim of fulfilling their daily needs and for sale. Furthermore the squid also as natural bait in fishing activities [3]. The fishing conducted by traditional fishermen in North Sulawesi waters generally uses simple fishing rods and the fishing technique is also still traditional using vertical handline as squid fishing gear (jigs) [4].

Squid and cuttlefish fishing by fishermen in North Sulawesi waters generally use horizontal fishing techniques or squid trolling [4]. The fishing gear used uses artificial bait resembling shrimp either made by the fishermen themselves or factory-made and pulled behind the boat while rowing. The construction of the squid fishing rod is in the shape of a shrimp or fish with many fishing eyes on the tail, but no return hook or barb [5].



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Traditional squid fishing in Motto Village is a hereditary legacy and has been going on for a long time, but so far information related to conventional squid fishing in Motto Village has not been well informed and identified. Based on the existing background, it is necessary to conduct a study related to traditional squid fisheries in terms of technical and economic aspects in Motto Village, North Lembeh District, Bitung City.

## 2. METHODS

The research was conducted in the Motto Village, North Lembeh Subdistrict, Bitung City, during September-November 2021. The object of study was fishing and economic benefits of squid for the Motto community. Assets data collection was done through interviews and direct observation. Respondents were fishermen of Motto Village who were selected by purposive random sampling. Purposive random sampling was used to ensure the eligible respondents were included based on criteria: fishing as main livelihood, experienced and competent capability among other fishermen, and an affable/open-minded person. The respondents were 4 persons: the squid jig maker, the leader of fisherman group, and the elder of the fisherman group. Depreciation rate of asset obtained based on the formula as follows [6]:

$$\text{Depreciation} = \frac{\text{Cost-Salvage value}}{\text{Economical life}} \quad (1)$$

The data collected on the traditional squid fishing aspect in Motto Village were fishing fleet specification, fishing gear specification, fishing operations and fishing ground. Data obtained from the field were analyzed and discussed using descriptive analysis. Tools and materials included stationery, questionnaires, documentation tools, boats and squid fishing gear.

## 3. RESULTS AND DISCUSSION

### 3.1. General Condition of Motto Village, Bitung City

Motto Urban Village is one of the areas in North Lembeh Sub-district, Bitung City, North Sulawesi with an area of 410 hectares. The area covers 14.22% of the total area of North Lembeh Sub-district. There were 676 people living in Motto and most of them were fisherman (108 fishermen) [7].

Motto sub-district is administratively divided into two community associations (RW) and six neighborhood associations (RT). Motto Village is inhabited by 676 residents, comprising 348 men and 328 women. Based on the total number of residents, the average density is 164.88 people/km<sup>2</sup> [7]. The main livelihood of the residents is as fishermen, especially squid fishermen [8]. Apart from being fishermen, residents are also active in taking care of their respective fields and gardens.

The western boundary of Motto Village is the Binuang Village, the eastern part is the Maluku Sea waters, the northern part is Nusu Village, and the southern part is Posokan Village (Fig 1).

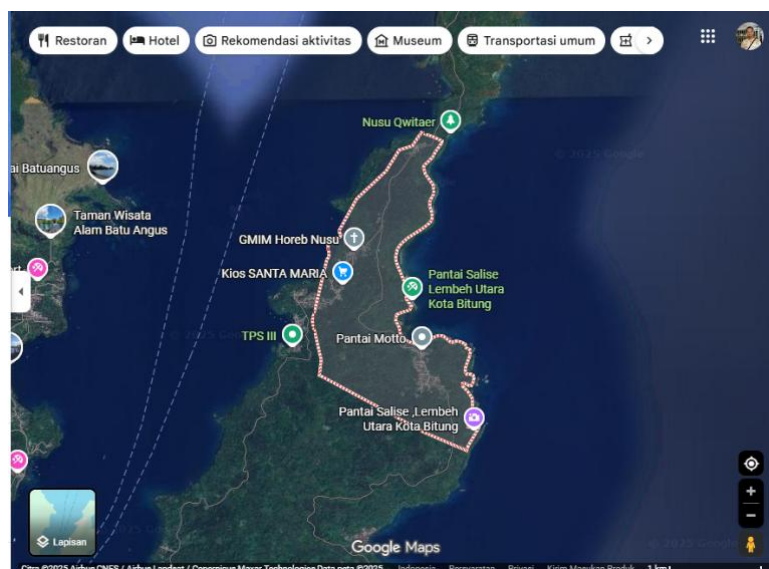


Figure 1. Posakan Village



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### 3.2. Fishing Aspect

Squid fishing in Motto using wooden-coated fiberglass boats and fiberglass boats. These boats are generally privately owned by fishermen in Motto Village. Fishing activities are conducted on a one-day basis. Departure in the afternoon and return at night until morning. The specifications of the boats used are presented in Table 1.

| Table 1. Specification of a fishing boat of Motto Fisherman |                                |
|-------------------------------------------------------------|--------------------------------|
| Part of boat                                                | dimension                      |
| Length                                                      | 600 – 700 cm                   |
| Width                                                       | 80 cm                          |
| height                                                      | 60 cm                          |
| Material                                                    | wood/plywood coated fiberglass |
| Machine                                                     | 13 – 22 PK                     |
| fuel                                                        | Gasoline                       |
| Technical life of boat $\pm$ 5 years                        |                                |
| Technical life of machine $\pm$ 3 years                     |                                |

The boats used by fishermen in Motto Village are small. The loading capacity of this boat is between one and two people. These boats usually only carry the boat owner during fishing operations. In general, the size of Motto fishermen's boats does not differ much. This small-sized boat, in addition to being easy to operate, is also cheaper in operational and maintenance costs. By using a small boat, the initial cost of starting a business can also be reduced (Fig. 2). Fisherman of Motto uses 13-22 PK Machine. This machine pretty useful for one-day fishing. Most of the Motto fishermen's boats and squid hooks are made by the fishermen themselves. By creating their own squid hooks, fishermen are confidence of the quality and reduce existing expenses. The fisherman also buys the squid hook from another fisherman (neighbor). One day of squid fishing practices with traditional squid jigs can maintain resource sustainability. These fishing practices only catch a limited amount of squid according to their boat capacity. Traditional squid fishing gear also can be a limitation to the amount of catch. Due to traditional gear and methods, the fisherman only catches a limited number of squid during their trip.

Handline, along with its various models, are the dominant fishing gear used by Lembeh fisherman as well as Motto fisherman [9]. The squid handline used by Motto fisherman consists of a roller, line, and custom squid hook. The roller is made of plastic or wood. The squid hook is made from a steel bar coated with tin. The barb is placed at the tip. The fluorescence placed near the barb, it reflects light to attract squid [10]. The squid handline is equipped with copper rope to tie the natural bait. Based on data obtained from Motto Village, in 2021 there were 261 residents as fishermen out of a total of 289 men of working age in Motto Village. These fishermen, on average, own a fleet of fishing boats that they operate.



Figure 2. Fishing boat of Motto Fisherman

The fishermen of Motto village only use one type of fishing gear to catch the squid. They use squid handline or squid jigs. This is pretty different from the other region that also use Bouke ami, cast net [2] and purse seine to catch squid [11], [12].

The squid jig fishing activity began at 5 PM. The fisherman preparing boat, jigs, bait etc. Soon after preparations finished, they set sail for the fishing ground. Fishing operations were conducted in fishing ground. The fisherman illuminates the fluorescence, attaches the squid hook with natural bait and then sets on to the water. The fisherman pulled the jig up and down to attract squid. The fluorescence and its light will attract squid [13] as well as natural bait. The fishermen use fish or squid as natural bait (Fig. 2). Soon after the squid get the bait, the fisherman lifts the squid and puts it down in the bucket. The fishing operation usually ends at midnight or dawn depending on the catch they get. To find out about the squid fishing ground, squid fishing was conducted by researchers and fishermen around the Motto fisherman used to do squid fishing. The squid fishing was conducted in five positions (Fig. 3).

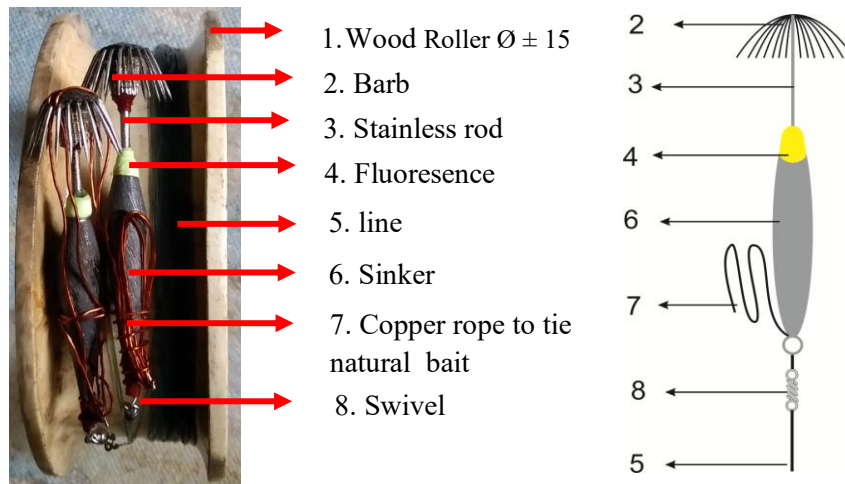


Figure 3. Squid's handline of Motto fisherman

The squid fishing ground of motto fisherman based on their experience and their parents' habit (traditional fishing ground). The motto fishermen also share their information among others during fishing where the optimum location at present. In another area (Bangka Belitung) the squid fishing ground is also in a fixed lift net [14]. The Motto fisherman can do 20-25 trips. The trip may vary according to the weather conditions.

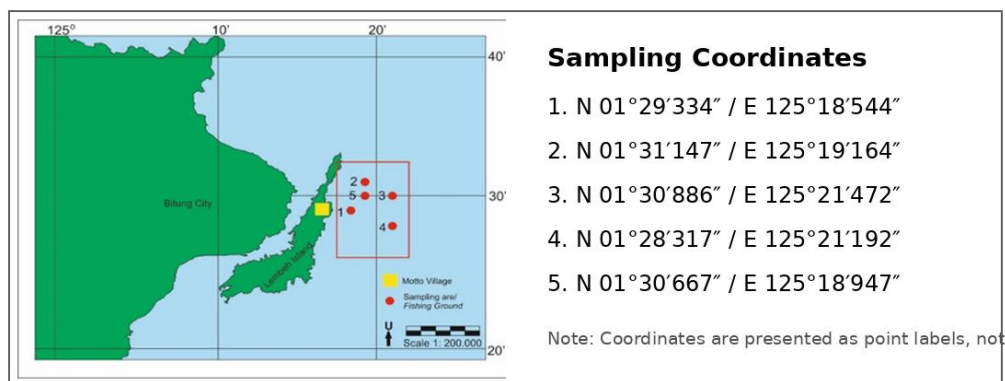


Figure 3. Sampling area

### 3.3. Economic Aspects

Investment is the amount of funds spent to obtain benefits in the future. In squid fishing, various equipments is used as investments as follows:

- Boat (7 m x 0.8 m x 0.6 m). This equipment costs Rp. 8.540.000, - /Unit. The boat may last for 5 years. The boat can depreciate approximately Rp. 1.208.000, -/year.
- Machine. The fisherman used an outboard motor as its propulsion system for the boat. They use a Honda 13 PK. It costs Rp. 6.000.000, -. The machine may last for 3 years. The cost depreciation of the machine is approximately Rp. 1.000.000, -/year.
- Squid handline. The cost of 1 set of squid handline was Rp. 144.500, -. The handline may last for 3 months. The fisherman can have two to five sets of squid handlines.



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The total investments in squid fishing were Rp. 14.684.500, -. The fixed cost of squid fishing is cost of boat maintenance, cost of accidental maintenance and depreciation. These costs are not affected changes in squid fishing activity [15]. The fixed monthly cost of squid fishing is approximately Rp. 592.608, -. The variable costs of squid fishing are gasoline/fuel, food/cigarettes, and drinking water. The variable costs of squid fishing will change in proportion to changes in the volume of activities [16]. The variable cost per month of squid fishing was approximately Rp. 1.500.000, - so the fixed cost and variable cost of squid fishing per month were Rp. 2.092.608, -.

Revenue is obtained from the sale of catches. The average squid catch of fishermen each day of fishing was two buckets or 24 kg. The price for each bucket was Rp. 120.000, -. The amount of catch was approximately 480-600 kg per month. The total income/month was Rp. 4.800.000, - to Rp. 6,000,000, -. Squid caught by fishermen in Motto Village depend on the weather. If the weather is good, they can go fishing every day.

The estimated profit of Motto fishermen is Rp. 2.707.392, - to Rp. 3,907,392, - per month. Profit is something that must be generated by fisherman so that fishing operation can remain sustainable, such as to buy new machine, boat, maintenance and other. The profits of squid fishing of Motto fisherman seem to be low and need to be increased. The profits themselves are specially for fulfilling daily household needs. To improve the fishermen's income, various ways can be implemented, such as : fuel subsidies [17], involving the wife's of fishermen to take efforts [18], making a proper policy to support the fishermen such as, loans, introducing modern technology as well as providing fishing support infrastructure, financial management and other [19].

Marketing is an essential activity in running a fishery business, because fishery products do not last long [20]. Marketing flow is one aspect in supporting the sustainability of fisheries. Other aspects are fishing, product processing/diversification, and product distribution [21]. Marketing channels play an essential role in price differences. The marketing channel for squid caught by Motto Village fishermen is as follows:

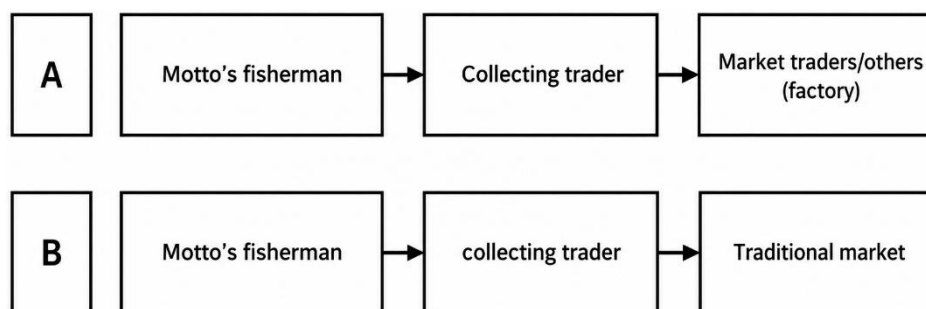


Figure 4. Marketing flow of Motto squid

In a type A marketing flow, the fisherman directly sells the squid to a collecting trader. The collecting trader sells it to a market trader or factory. In this type, the squid will be exported or sold outside Bitung. In a type B marketing flow, the fisherman sells the squid to a collecting trader, and the collecting trader sells it to the trader in a traditional market. In this type, the squid will be marketed in Bitung or its surrounding area.

In Motto village, squid fishing supports the economic and food security of Motto village members. The development of squid fishing activities is related to labor absorption for surrounding coastal communities [22]. Squid as an economically high target species in several WPPNRI shows that squid is one of the driving actors in Indonesian fisheries [2]. Adaptive management strategies need to be implemented in order to maintain the sustainability of squid utilization [23].

### 3.4. Issues of Motto Squid Fishing

There were three issues of Motto squid fishing: 1. economic feasibility, 2. income sustainability, and 3. sensitivity to weather conditions. The value-added processed product of squid Motto can be adopted to increase income and maintain income sustainability. Squid crackers, vacuum-packed squid, and spicy sauce were the examples. Squid-based products also could increase the economic feasibility of squid fishing. The micro, small, and medium enterprises (UMKM) of squid Mottos can be founded and supported by the government to implement the plan in order to strengthen cooperatives and support direct marketing channels channels [24].



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Establishing a fair price index for squid caught by fishermen can also be done to support income sustainability [25]. Sensitivity to weather conditions can be minimized by accessing the daily, weekly, or monthly weather conditions supplied by the government and switching to other temporary activities such as farming, boat and machinery maintenance, selling squid-based products, etc.

#### 4. CONCLUSION

The results showed that squid fishing activities are carried out in one day fishing. The fishermen of Motto conduct squid fishing using the squid jigging method. This occurs because of the inheritance method they had before by their ancestors. Fishermen conduct approximately 25 squid fishing trips in one month if the weather conditions are good. Squid fishing activities in Motto waters are still profitable and can be continued and improved. The fair-price establishment and diversification of squid-based added-value products, such as squid crackers, salted squid in vacuum-sealed bags, etc., need to be implemented and supported by government to increase fishermen's income and economic feasibility of squid fishing. There are two marketing flows of squid in the Motto waters. The squid is sold to market trader/factory or to traditional market.

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