Production Factors on Hand Line Catch Results at the Ocean Bungus Fishing Port, West Sumatra Province

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Abstract

In 2020, the production volume of fish landed at PPS Bungus reached 4,776.14 tons. In 2021, the production volume increased to 5,531.41 tons. From this data, it can be concluded that there was a significant increase in fish production from 2020 to 2021, from 755.27 tons to 1,510.54 tons. Therefore, it is necessary to analyze the factors that affect the catch. This study aims to determine which factors affect hand line catch production and the relationships between these factors and hand line catches. This research will be conducted in May 2023 at PPS Bungus, West Sumatra Province. The method used in this research is the survey method, involving direct field observations, the collection of primary and secondary data, and interviews with handline boat fishermen. The results of the regression analysis showed that the ship's tonnage (X1), engine power (X2), crew (X5), skipper experience (X6), and cost of supplies (X7) significantly influenced the catch. In contrast, the length of time at sea (X3) and the number of fishing rods (X4) did not show a significant effect.

1. Introduction

Bungus Ocean Fishing Port (PPS) is one of 22 fishing ports that are Technical Implementation Units (UPTs) of the Ministry of Maritime Affairs and Fisheries (KKP) and are under the supervision of the Director General of Capture Fisheries. PPS Bungus is located in Bungus Barat urban village, Bungus Teluk Kabung sub-district, Padang City, West Sumatra Province. Geographically, PPS Bungus is located at coordinates 010 00' 023 - 010 00' 15." LS and 1000 00' 233 - 1000 00' 34" East. The geographical location of PPS Bungus is very strategic, as it is in the middle of Sumatra Island, close to the fishing area, so the quality of the caught fish can be maintained as the catching day becomes shorter. PPS Bungus is the only Ocean Fishing Port located on the west coast of Sumatra (Bungus Report, 2019).

Hand line is the simplest type of fishing gear. Consists of a fishing rod, fishing line, and ballast or bait. The fishing ground for operating hand lines is quite open and varied, allowing hand lines to be operated from the surface to the bottom of the water, in coastal waters, and in the deep sea (Mulyadi et al., 2015). According to Putra et al. (2014), the fishing fleet that has carried out many fishing activities since 2012 at the Bungus Ocean Fishing Port (PPS) consists of tuna boats measuring 15 to 30 GT using handline fishing gear. According to Darondo et al. (2020), the handline is one of the effective and specialized fishing gears for catching tuna (*Thunnus* sp.) and is very suitable for operation in the territorial sea of Indonesia.

Fish production at PPS Bungus comes from the catch of fishing vessels landed at the port, including local fishing boats, Purse Seine, Hand Line, and Long Line, as well as collecting and transporting vessels. In 2020, the volume of fish production landed at PPS Bungus reached 4,776.14 tons, with a value of Rp. 111,028,457. In 2021, the production volume increased to 5,531.41 tons, with a value of IDR 105,207,889. From this data, it can be concluded that there was a significant increase in fish production of

755.27 tons, or 15.81%, from 2020 to 2021 (PPS Bungus Annual Report, 2021).

According to Sinaga et al. (2014), production factors are the most important thing in producing a product. In analyzing the specific technology that can be used, we must know the production process and how to manage production factors so that optimal and efficient production results can be obtained. Production factors (inputs) in the fishing industry include the number of crew members, vessels, main engines, and fishing aids. Efficient management of production factors will result in an optimal increase in production. The efficiency of the production process is very important for increasing revenue and achieving maximum profit for business actors. This study focuses on production factors (inputs) that affect the effectiveness of handline fishing. Some of the factors identified include the vessel's Gross Tonnage (GT), engine power, fishing distance, number of crew members, number of fishing lines, captain's experience, and cost of supplies (Marlina, 2016).

The importance of production factors in fishing technology, particularly in the context of longlines, cannot be overlooked. This fishing gear stands out for its high degree of selectivity, reflected in standardized line size, site planning, and seasonal adjustments. The efficiency of a fleet of vessels depends largely on the ability to identify and utilize production factors that affect catch (Hunawa, 2016).

The purpose of this study is to determine what factors affect the production of the handline catches and the relationship between these production factors and handline catches.

2. Methodology

2.1. Time, Place, and Materials

This research will be conducted in May 2023 at PPS Bungus, West Sumatra Province.

2.2. Method

The method used in this research is a survey method, involving direct field observations, the collection of primary and secondary data, and interviews with fishermen on handline boats using prepared questionnaires.

2.3. Data Analysis

Data analysis in this study included multicollinearity and simple regression analyses. Multicollinearity analysis is used to determine whether each independent variable (production factor) is truly independent or correlated with other independent variables. At the same time, multiple regression analysis is used to examine the complex relationship between the independent variables (production factors) and the dependent variable (handline catch). The multiple regression function equation used in this study is as follows:

$$Y = a + b1X1+b2X2+b3X3+b4X4+b5X5+b6X6+b7X7$$

Description:

Y	=	Total catch (kg)
a	=	Intercept (cut-off point)
b	=	Regression coefficient of each production factor
X1	=	Tonnage of ship
X2	=	Engine power (PK)
X3	=	Length of time at sea (days)
X4	=	Number of fishing lines
X5	=	Crew (person)
X6	=	Skipper experience (years)
X7	=	Cost of supplies.

3. Result and Discussion

Hand Line Catch Unit

In this study, researchers analyzed a sample of 15 hand line vessels at the Bungus Ocean Fishing Port (PPS). The results revealed significant variations in the size and characteristics of these vessels. The size of the handline vessels ranged from 13 GT to 30 GT. The smallest vessel was KM. Arkarna, while the largest vessels included KM. Tiar Jaya 01, KM. Anniesha 02, and KM. Bina Sumber Jaya. This indicates diversity in the capacity and production potential of each vessel. The length of hand line vessels also shows diversity, ranging from 10 to 21.1 meters. KM. Bina Sumber Jaya is the shortest vessel, while KM. Purse Seine 01 is the longest vessel. Vessel length has direct implications for catch holding capacity. The most common fishing gear used at PPS Bungus is hand-line vessels. The number of crew members on each vessel ranged from 6 to 8 people, indicating that each vessel was equipped with an adequate team for fishing operations. Yellowfin Tuna dominate the catch from handline vessels at PPS Bungus. This reflects the main target species of fishing activities in this area. On average, hand line vessels conduct fishing trips at sea for 7 to 14 days. This time duration indicates the length of fishing operations conducted by handline vessels in the waters around PPS Bungus.

Handline is a type of fishing gear used by traditional fishermen to catch fish at sea. Hand

line is the simplest type of fishing gear. The parts of the construction of hand line fishing gear used by hand line boats at PPS Bungus consist of towline, snap, kili-kili, baseline, sinker, fishing line, launcher line, join line, and fishing rod.

Factors Affecting Hand Line Catches

Ship tonnage is a quantity that indicates the capacity or volume of rooms that are closed and considered watertight inside the ship. The ship's tonnage has a significant influence on the catch; the greater the ship's GT, the greater the effect on the catch, fishing gear, and crew included in the fishing operation.

The ship's engine is an important component, providing propulsion. The ship's engine affects the operation of the fishing fleet by accelerating the ship to the fishing ground. Sulandari (2011) states that engine power is related to the driving force of the ship to the fishing ground and to the driving force when pulling the fishing line. If 1 PK increases the engine power, the catch will also increase.

The length of time at sea is the length of time it takes for the ship to go to sea from departing to anchoring again in units of days. The longer the trip/sea, the more the catch increases. Dewi et al. (2020) state that the length of the trip at sea can affect the production of fishing gear, as the longer the day at sea, the more catches are obtained.

The number of fishing lines affects the amount of catch: the more lines, the more catches are obtained. Hutama et al. (2017) state that the more fishing gear used and the more replacement or backup gear, the greater the increase in catch production. According to Sulandari (2011), crew members are all people on board the ship who work on the ship, except the captain, and the number and skills of crew members affect the process of operating fishing rods.

The skipper is the supreme leader on board, managing, operating, and directing the vessel. The skipper's experience learns the character of the waves, weather, wind, and fish species. The high and low income of the fishing fleet is highly dependent on the captain. Sulandari (2011) states that an experienced skipper will be able to easily steer the ship to determine the fishing area, quickly overcome any problems that arise during fishing operations, and experience using fishing technology.

The cost of supplies affects the production of handline catches. The cost of supplies includes fuel, ice blocks, clean water, and food ingredients. Vessels with a large GT have a large catch capacity, so they need many ice blocks. As for consumption, cigarettes, and clean water, it depends on the number of crew members. Khasanah (2010) added that the cost of supplies is the cost used in the sea-fishing business and changes proportionally to the quantity of fish caught.

Multicollinearity Analysis

The multicollinearity test assesses whether the independent variables in the study are correlated. A good regression model suitable for research avoids multicollinearity, provided the VIF value is <10 (Nihayah, 2019). The results of the multicollinearity test conducted in SPSS version 18.0 are shown in Table 1.

Table 1. Multicollinearity Test Results

No.	Variable Dependent	Collinearity statistic Tolerance	VIF
1	Ship Tonnage	.102	9.827
2	Engine Power	.418	2.393
3	Length of time at sea	.313	3.193
4	Number of Fishing Rods	.257	3.892
5	ABK	.156	6.422
6	Skipper Experience	.722	1.386
7	Supplies Cost	.157	6.384

The results of this study indicate that the production factors considered are ship tonnage, engine power, time at sea, number of fishing rods, crew, skipper experience, and cost of supplies. Based on the F test, the production factors of handline fishing gear can account for 68.8% of the catch, while other factors account for the remaining 31.2%.

Factors that have a positive effect on hand line catches at PPS Bungus are ship tonnage (X1), engine power (X2), crew (X5), skipper experience (X6), cost of supplies (X7) while those that hurt hand line catches are the length

of time at sea (X3), and the number of fishing lines (X4). Other research was also conducted by Marlina (2016) on "Analysis of Production Factors of Hand Line Fishing on Catches in Prigi Waters, Trenggalek Regency, East Java" stated that the GT of the ship (X1), the number of crew members (X2), fishing distance (X3), the number of fishing rods (X4), engine power (X5), skipper experience (X6), and the cost of supplies per trip (X7) together have a significant effect on the dependent variable of catch on hand line fishing at a 95% confidence interval. All variables related to production factors in handline fishing together have a real/significant effect on catch.

Ship tonnage (X1), with a regression coefficient value of 5.845, means that the relationship shows a positive influence between ship tonnage and the amount of catch. This is consistent with the opinion of Suryana et al. (2013), who state that ship size (GT) has a significant effect on catch: the larger the ship, the greater the catch. Engine power (X2), with a regression coefficient of 0.439, indicates a positive influence of engine power on the amount of catch. According to Sulandari (2011), engine power is related to the ship's driving force to the fishing ground and to the driving force when pulling the fishing line. If engine power increases by 1 PK, the catch will also increase.

The length of fishing (X3), with a regression coefficient of -5.108, indicates a negative influence of length on catch. The use of fuel causes this; the longer the fishing trip, the more fuel will be used. This is not in accordance with the opinion of Dewi et al. (2020), which states that the length of the trip/sea can affect the production of a fishing gear. This is because the longer the day at sea, the more catches are obtained. The regression coefficient of -64.475 for the number of fishing lines (X4) indicates a negative relationship between the number of fishing lines and the number of catches. Increasing the number of fishing rods by 1 will reduce the catch. This is not in accordance with the opinion of Hutama et al. (2017), which states that the more fishing gear used and the more replacement or backup fishing gear, the more catch production.

Crew (X5) with a regression coefficient value of 186.560, meaning that it shows a positive relationship between the crew and the amount of catch. According to Sulandari (2011), crew members are all people who are on the ship, except the captain, and the number and skills of crew members affect the process of operating fishing rods. The skipper's experience (X6), with a regression coefficient of 4.392, indicates a positive relationship between skipper experience and catch. Sulandari (2011) states that an experienced skipper will be able to easily navigate the ship to determine the fishing area, quickly overcome problems that arise during fishing operations, and experience using fishing technology. The regression coefficient of 1.890 for supplies (X7) indicates a positive relationship between the cost of supplies and the amount of catch. Khasanah (2010) added that the cost of supplies is the cost used in the sea-fishing business and changes proportionally to the quantity of fish caught.

4. Conclusion

The results of the regression analysis show that ship tonnage ($_{X1}$), engine power ($_{X2}$), crew ($_{X5}$), skipper experience ($_{X6}$), and cost of supplies ($_{X7}$) significantly influence the catch. In contrast, the length of time at sea (X3) and the number of fishing rods (X4) do not show a significant effect. Where ship tonnage is the main factor affecting catch, with a regression coefficient value of 5.845, indicating a positive relationship between tonnage and loadability of hand line catches.

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