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# Factors Affecting the Amount of Marine Supply on Sondong and Gillnet Ship at UPT Fishery Port of Riau Province

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## Abstract

The purpose of this study was to determine the factor of the need for supplies at sea in sondong boats and gillnets and to prove how strong the relationship between these variables is. This research was conducted in January 2022 at the UPT Fisheries Port of Riau Province using the survey method. The results showed that the factors of ship size, length of time at sea, and engine power had a strong effect on the amount of fuel carried. Based on the F-test with a confidence level of 87.1%. According to the T-test, the length of time at sea has the greatest influence, while for the application of ice, the factors of length of time at sea and catch greatly affect the amount of ice in the T-test with a confidence level (coefficient of determination) of 46.7%. According to the T-test, the length of time at sea has the greatest effect on the ice supply on the sondong ship. In gill nets, boat sizes, length of time at sea, and engine power have a strong effect on the amount of fuel carried. Based on the F test with a confidence level of 91.5%. According to the T-test, the length of time at sea has the greatest effect. Whereas in the provision of ice in gill net vessels, the length of time at sea and the catch also greatly affect the amount of ice carried with a confidence level (coefficient of determination) of 88%. According to the T-test, the length of time at sea has the greatest effect on the supply of ice in gill net boats

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## 1. Introduction

Dumai City is one of the coastal areas in Riau Province which is one of the contributors to the fisheries sector. Geographically, Dumai City is located at 01° 24' 23" N, and B 101° 28' 13 "E with an area of 1,727,385 km<sup>2</sup> and an ocean area of 1,302.40 km<sup>2</sup>. The Fisheries Port Technical Implementation Unit (UPT) of Riau Province is used as a center for fishermen to carry out fish landings, fishing business activities, and other activities.

Fishermen based at UPT PPI Dumai operate fishing gear for sondong, gill nets, splints, and longlines. Sondong is the dominant fishing gear used by fishermen at UPT Fisheries Port of Riau Province (Zain, 2012). Based on data obtained from the UPT Port of Fishery, in 2019 there were 157 fishing fleets

consisting of 50 units of sondong fishing gear and 106 fishing nets (UPT Report, 2019).

Activities for replenishing supplies at sea that can be carried out at the UPT Fisheries Port of Riau Province include filling ice blocks, fuel oil, food ingredients, and others. The provision of ice is one of the services that has an important role in fishing ports, this is because ice has an important role in the continuity of production and handling of the quality of fishery products. The supply of ice for fishing boats depends on the amount of catch caught and the number of ships going to sea. The availability of ice in sufficient quantities greatly influences the smooth running of fishing operations (Mundjari, 2010). Diesel fuel is one of the important types of fuel in fishing operations, one of these fuels is

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widely used to drive fishing vessels because in general, the engine used is a diesel engine.

The way the gillnet and sondong fishing gear operate is very different. Sondong is an active fishing gear while gillnet is a passive fishing gear. The amount of fuel purchased by sondong fishermen at sea depends on the length of the fishing trip, boat size (tonnage), engine size (HP), and engine age (Lisnasari, 2015). According to Fajriati (2021), the amount of ice supplies carried by fishermen at PPS Bungus depends on the number of catches and the length of the fishermen's fishing trip. Differences in how fishing gear operates, length of a fishing trip, vessel size, and engine size on sondong and gillnet vessels are thought to affect the supplies they carry.

## 2. Methodology

### 2.1. Time, Place, and Materials

This research was carried out in January 2022 at the Fishery Port of Riau Province. The tools used in this study include stationery, cameras, and laptops. While the materials used are secondary data and primary data in the form of catch logbooks and questionnaires.

### 2.2. Method

The method used in this study is a survey method by making direct observations in the field and conducting interviews with sondong and gillnet fishermen.

### 2.3. Data Analysis

Data analysis in this study used the normality test, multicollinearity analysis, multiple regression analysis, F test or ANOVA, and T-test. The normality test is a test conducted to detect the distribution of data in one variable that will be used to have a normal distribution or not. The test used is the Kolmogorov-Smirnov test. According to Ghazali (2011), the multicollinearity test aims to test whether the regression model found a correlation between independent (independent) variables. To see whether there is multicollinearity, the tolerance value and its counterpart (2) variance inflation factor (VIF) is used. The cutoff value that is commonly used to indicate the presence of multicollinearity is a tolerance value  $\leq 0.10$  or the same as a VIF value  $\geq 10$ .

Multiple regression analysis was used to see the effect of the length of time at sea, engine power, and ship GT on the amount of

fuel carried. This analysis is also used to see the effect of catch factors and length of time at sea on the amount of ice carried. The multiple regression function equation used in this study is the Walpole Equation, 2005 as follows:

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Information:

- Y : Dependent variable (predicted value)
- $X_1, X_2$  : Independent variable
- a : Constant (value Y if  $X_1, X_2, \dots, X_n = 0$ )
- b : Regression coefficient

The amount of fuel supplies carried

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3$$

Information:

- Y : Amount of fuel carried (L)
- a : The amount of BBM carried If the Variables  $X_1, X_2$  and  $X_3$  have a value of 0 (Zero)
- b : Regression Coefficient
- $X_1$  : Length of sailing time
- $X_2$  : Ship size
- $X_3$  : Ship engine power

The number of ice supplies brought

$$Y = a + b_1X_1 + b_2X_2$$

Information:

- Y : Amount of Ice brought (L)
- A : Amount of Ice to Carry If Variables  $X_1, X_2$  and  $X_3$  have a value of 0 (Zero)
- B : Regression Coefficient
- $X_1$  : Length of sailing time
- $X_2$  : Catch

The F test is used to test the regression coefficient (slope) hypothesis simultaneously and ensure that the selected model is feasible or not to interpret the effect of the independent variable on the dependent variable. The coefficient of determination test ( $R^2$ ) is carried out to determine and predict how big or important the contribution of the influence given by the independent variables is joined to the dependent variable (Ghozali, 2011).

## 3. Result and Discussion

Sondong fishing gear is a type of cone-shaped active fishing gear that has one bag, operated at the bow of the boat driven by a motorized boat with the aim of the main catch, namely shrimp. The construction of sondong fishing gear used by fishermen in Dumai City is as follows: sondong net feet and sondong legs

are made of tepis wood (*Polyalthia glauca*) which has a round shape with a length of wood 8 meters, with a diameter of 6-10 cm. The wood consists of 2 sticks which are tied using bolts and ropes at the bow of the ship so that they form a triangle (Siregar, 2019).

Bottom gillnet fishermen in Dumai City have used motorboats to carry out their fishing efforts. The ship size that is widely used is the size of 5 GT. With an average length of 14 m, 3 m wide, and 2.5 m high. Basic gill nets in general, basic gill nets in Dumai City also have a construction consisting of nets (webbing),

buoys, weights, peluntang, and upper and lower ropes. As the name suggests, basic gill nets are operated at the bottom of the waters with the aim that the fish will be entangled in the meshes such as the heads (snagged), the gills (gilled), the back (wedged) and are caught by being spun.

From the 10 sample research vessels consisting of 10 sondong boats and 10-gill net boats, data on the amount of ice carried for a long time at sea and the catch obtained were as follows.

**Table 1. Amount of ice, length of time at sea, and catches of sondong boats and gill nets**

No	Ship name	Ship Type	Ice Cube	Sea Time (Days)	Catch (kg)
1	KM. AZKIA	Sondong	6-7	2-5	100-300
2	KM. AZWAR JAYA	Sondong	5-6	2-4	100-200
3	KM. TUAH ANANDA	Sondong	5-6	2-4	100-200
4	KM. AMELIA	Sondong	4-5	2-3	50-150
5	KM. SUMBER REZEKI	Sondong	4-5	2-6	100-300
6	KM. ARJUNA	Sondong	6-7	2-5	100-250
7	KM. GONGGO MINO	Sondong	6-7	2-5	100-250
8	KM. RIAN	Sondong	6-7	2-5	100-250
9	KM. KARUNIA	Sondong	4-5	2	100-200
10	KM. KIA	Sondong	4-5	2	100-200
11	KM. ZAKI	Gill Nets	4-5	2-3	50-100
12	KM. AMAR	Gill Nets	6-7	2-5	100-300
13	KM. SIFAI	Gill Nets	5-6	2-4	100-150
14	KM. KURNIA JAYA	Gill Nets	6-7	2-5	100-300
15	KM. ANDINI	Gill Nets	4-5	2-6	150-350
16	KM. DIMITRIS	Gill Nets	4-5	2-6	150-350
17	KM. RAHMAD BUNAYYA	Gill Nets	5-6	2-4	100-150
18	KM. ACAN	Gill Nets	4-5	2-6	150-350
19	KM. FIRMAN MAJU	Gill Nets	5-6	2-7	150-400
20	KM. NURIN JAYA	Gill Nets	5-6	2-7	150-400

**Table 2. Ship size, length of time at sea, engine power, and fuel for sondong boats and gill nets**

No	Ship name	Ship Type	Size Ship (GT)	Sea Time (Days)	Engine Power	Fuel (L)
1	KM. AZKIA	Sondong	4	2-5	24	200-300
2	KM. AZWAR JAYA	Sondong	3	2-4	20	150-250
3	KM. TUAH ANANDA	Sondong	3	2-4	20	150-250
4	KM. AMELIA	Sondong	2	2-3	16	70-200
5	KM. SUMBER REZEKI	Sondong	5	2-6	30	200-400
6	KM. ARJUNA	Sondong	4	2-5	24	200-300
7	KM. GONGGO MINO	Sondong	4	2-5	24	200-300
8	KM. RIAN	Sondong	4	2-3	24	200-300
9	KM. KARUNIA	Sondong	3	2-5	20	150-250
10	KM. KIA	Sondong	3	2-4	20	150-250
11	KM. ZAKI	Gill Nets	2	2-3	16	70-150

12	KM. AMAR	Gill Nets	4	2-5	24	100-250
13	KM. SIFAI	Gill Nets	3	2-4	20	100-200
14	KM. KURNIA JAYA	Gill Nets	4	2-5	24	100-250
15	KM. ANDINI	Gill Nets	5	2-6	30	150-300
16	KM. DIMITRIS KM. RAHMAD	Gill Nets	5	2-6	30	150-350
17	BUNAYYA	Gill Nets	3	2-4	20	100-200
18	KM. ACAN	Gill Nets	5	2-6	30	150-350
19	KM. FIRMAN MAJU	Gill Nets	6	2-7	35	150-400
20	KM. NURIN JAYA	Gill Nets	6	2-7	35	150-400

### 3.1. Fuel Supplies in the Sondong Ship

The results of the data collected show that the data is normally distributed, and the independent variables are independent or do not affect each other. The results of the multiple regression test on the length of time at sea, the size of the ship, and the engine power on the amount of fuel carried obtained the following equation.

$$Y = -8.519 + 56.676 X_1 + 0.833 X_2 + 0.320 X_3$$

Information:

- Y : Amount of Fuel (L)  
 X<sub>1</sub> : Length of Sea (Days)  
 X<sub>2</sub> : Ship Size (GT)  
 X<sub>3</sub> : Engine Power (PK)

Based on the equation above, it shows that the intercept value is  $-8.519$ , in the multiple regression equation it shows the constant value in this case the intercept value is not significant. The negative sign on the intercept indicates that the cut point is on the negative Y-axis. The length of time at sea is positive (unidirectional) at  $56.676$ . This shows that the longer you go to sea it can affect the increase in the amount of fuel by  $56,676$ . The coefficient value for the ship size variable is positive (unidirectional) of  $0.833$ . This shows that if the size of the ship is getting bigger, it can affect the increase in the amount of fuel by  $0.833$ . The coefficient value for the engine power variable is positive (unidirectional) at  $0.320$ .

The results of the F test showed that the factors of length of time at sea, ship size, and engine power simultaneously affect the amount of fuel. The coefficient of determination (R<sup>2</sup>) obtained is  $87.1\%$ , meaning that the influence of the independent variables used in the model has an effect of  $87.1\%$  on the dependent variable and the remaining  $12.9\%$  is influenced by other variables not included in the model. The results of the T-test showed that the long-

time factor at sea was the most influential in the amount of fuel carried.

The results showed that the fuel data for the sample sondong fleet through the data normality test were declared normal because the P value was  $>0.05$  where the P value obtained was  $0.153$ . In the factor multicollinearity test, ship size, engine power, and length of time at sea are not related to each other or there is no multicollinearity and each factor fulfills the requirements where the tolerance value is  $> 0.1$  and the VIF value is  $<10$ . In the multiple regression test, the factor equation is obtained which shows a positive relationship, which means that as each factor increases, both ship size, engine power, and length of time at sea, the amount of fuel carried also increases. Based on the results of the F test (ANOVA) stated that each of the factors of length of time at sea, engine power, and ship size had a strong effect on the amount of fuel the sondong fleet carried. The coefficient of determination (R<sup>2</sup>) obtained is  $87.1\%$  while the remaining  $12.9\%$  is thought to be influenced by other variables not included in the model, such as engine age, engine temperature, etc.

Furthermore, to determine which factor has the most dominant effect on the amount of fuel the sondong fleet carries, a T-test is carried out. Then followed by engine power and the last is the size of the ship. The longer the sea or sondong fleet operates, the more fuel it will need. The larger the size of the sondong fleet, the greater the water resistance experienced by the ship so it requires greater engine power and increases the amount of fuel. In line with research (Shafira, 2021) states the consumption of fuel oil for fishing activities is influenced by the power of the engine and the working time of the fishing vessel's engine. So is the case with the length of time the ship's engine has been operating, the longer the ship's engine has been working or operating, the greater the amount of fuel needed. Another research

(Fajriati, 2021) stated that the longer the fishing trip, the longer the engine will be operated so the amount of fuel needed also increases. Likewise, the size of the ship also influences the amount of fuel that is carried because the larger the size of the ship, the greater the water resistance experienced by the ship, and requires a larger engine size so that it requires a greater amount of fuel.

### 3.2. Ice Supplies on the Sondong Ship

The results of the data collected show that the data is normally distributed, and the independent variables are independent or do not affect each other. The results of the multiple regression test on the length of time at sea, and the results of the catch on the amount of ice carried, obtained the following equation.

$$Y = 3.374 + 0.522 X_1 + 0.002 X_2$$

Information:

Y = Number of Ice (Blocks)

X<sub>1</sub> = Length of Sea (Days)

X<sub>2</sub> = Catch (kg)

Based on the above equation, shows that the intercept value is 3.374, in the multiple regression equation shows a constant value in this case the intercept value is not significant, and the length of time at sea is positive (unidirectional) of 0.522 this shows that the longer you go to sea it can affect an increase in the amount of ice by 0.522. The coefficient value for the catch variable is positive (unidirectional) of 0.002. This shows that if the catch is getting bigger, it can affect the increase in the amount of ice by 0.002.

The results of the F test showed that the length of time at sea and the catch together affect the amount of ice carried. The coefficient of determination (R<sup>2</sup>) obtained is 46.7%, meaning that the influence of the independent variables used in the model has an influence of 46.7% on the dependent variable and the remaining 53.3% is influenced by other variables not included in the model. The results of the T-test showed that the length of time at sea was the most influential factor in the amount of ice carried.

The results showed that the ice data on the sample sondong fleet through the data normality test was declared normal because the P value > 0.05 the result obtained was a P value of 0.172. In the multicollinearity test the catch and length of time at sea are not related to each other or there is no multicollinearity and each

factor fulfills the requirements where the tolerance value is > 0.1 and the VIF value is < 10. In the multiple regression test, the factor equations show a positive relationship, which means that each factor increases both the catch and the length of time at sea, so the amount of ice carried also increases. Based on the results of the F test (ANOVA) it was stated that each of the long fishing factors and catches had a strong effect on the amount of ice the sondong fleet carried. The coefficient of determination (R<sup>2</sup>) obtained is 46.7% while the remaining 53.3% is thought to be influenced by other variables not included in the model, such as ice quality, hold quality, etc.

Furthermore, to determine which factor has the most dominant effect on the amount of ice on the sondong fleet carried, a T-test is carried out. Based on the results of the T-test, it is found that the length of time at sea greatly influences the amount of ice on the sondong fleet carried, followed by the catch. The longer you go to sea or operate the sondong fleet, the more ice is needed. The more caught in the sondong fleet, the more ice is needed. In line with the research conducted (Fajriati, 2021), namely the longer the fishing trip, the more catches you will get. And also the more the catch, the amount of ice needed by fishermen will increase to maintain the quality of the catch.

### 3.3. Fuel Supplies on Sondong Ship

The results of the data collected show that the data is normally distributed, and the independent variables are independent or do not affect each other. The results of the multiple regression test on the length of time at sea, the size of the ship, and the engine power on the amount of fuel carried obtained the following equation.

$$Y = 19.530 + 50.513 X_1 - 0.617 X_2 - 0.122 X_3$$

Information:

Y = Amount of Fuel (L)

X<sub>1</sub> = Length of Sea (Days)

X<sub>2</sub> = Ship Size (GT)

X<sub>3</sub> = Engine Power (PK)

Based on the equation above, it shows that the intercept value is 19.530, in the multiple regression equation it shows a constant value, in this case, the intercept value is not significant. Sea time is positive (unidirectional) at 50.513. This shows that the longer you go to sea it can affect the increase in the amount of

fuel by 50,513. The coefficient value for the ship size variable is negative (opposite direction) of -0.617. This shows that the larger the size of the ship, it can affect the decrease in the amount of fuel by 0.617. The coefficient value for the engine power variable is negative (opposite direction) of 0.122. This shows that if the engine power increases, it can affect the decrease in the amount of fuel by 0.122.

The results of the F test showed that the factors of length of time at sea, ship size, and engine power simultaneously affect the amount of fuel. The coefficient of determination (R<sup>2</sup>) obtained is 91.5%, meaning that the influence of the independent variables used in the model has an influence of 91.5% on the dependent variable and the remaining 8.5% is influenced by other variables not included in the model. The results of the T-test showed that the long-time factor at sea was the most influential in the amount of fuel carried.

The results showed that the fuel data for the sample gill net fleet through the data normality test were declared normal because the P value > 0.05 the results obtained were the P value obtained 0.202. In the factor multicollinearity test, ship size, engine power, and length of time at sea are not related to each other or there is no multicollinearity and each factor fulfills the requirements where the tolerance value is > 0.1 and the VIF value is <10. In the multiple regression test, the factor equation is obtained which shows a positive relationship, which means that as each factor increases, both ship size, engine power, and length of time at sea, the amount of fuel carried also increases. Based on the results of the F test (ANOVA) it was stated that each factor of the length of time at sea, engine power, and ship size had a strong effect on the amount of fuel the gill net fleet carried. The coefficient of determination (R<sup>2</sup>) obtained is 91.5% while the remaining 8.5% is thought to be influenced by other variables not included in the model, such as engine age, engine temperature, etc.

Furthermore, to determine which factor has the most dominant effect on the amount of fuel carried by the gill net fleet, a T-test is carried out. Then followed by engine power and the last is the size of the ship. The longer you go to sea or operate a fleet of gill net boats, the more fuel is needed. The larger the size of the gill net fleet, the greater the water resistance experienced by the ship so it requires greater engine power and increases the amount of fuel.

In line with research (Shafira, 2021) states, the consumption of fuel oil for fishing activities is influenced by the power of the engine and the working time of the fishing vessel's engine. Likewise, the longer the ship's engine operates, the longer the ship's engine works or operates, the greater the amount of fuel needed. And another research (Fajriati, 2021) stated that the longer the fishing trip, the longer the engine will be operated so the amount of fuel needed also increases. The size of the ship also influences the amount of fuel that is carried because the larger the size of the ship, the greater the water resistance experienced by the ship, and requires a larger engine size so that it requires a greater amount of fuel.

### 3.4. Ice Supplies on Net Boats

The results of the data collected show that the data is normally distributed, and the independent variables are independent or do not affect each other. The results of the multiple regression test on the length of time at sea, and the results of the catch on the amount of ice carried, obtained the following equation.

$$Y = 2.145 + 0.273 X_1 + 0.008 X_2$$

Information:

Y : Amount of Fuel (L)  
 X<sub>1</sub> : Length of Sea (Days)  
 X<sub>2</sub> : Catch (kg)

Based on the equation above, shows that the intercept value is 2.145, in the multiple regression equation shows a constant value in this case the intercept value is not significant, and the length of time at sea is positive (unidirectional) of 0.273 this shows that the longer you go to sea it can affect the increase in the amount of ice by 0.273. The coefficient value for the catch variable is positive (unidirectional) of 0.008. This shows that if the catch is getting bigger, it can affect the increase in the amount of ice by 0.008.

The results of the F test showed that the length of time at sea and the catch together affect the amount of ice carried. The coefficient of determination (R<sup>2</sup>) obtained is 88.0%, meaning that the influence of the independent variables used in the model has an effect of 88.0% on the dependent variable and the remaining 12.0% is influenced by other variables not included in the model. The results of the T-test showed that the factors of length of time at sea and catch were the most influential factors on the amount of ice carried.

The results showed that the ice data on the sample gill net fleet through the data normality test was declared normal because the P value  $> 0.05$  where the P value obtained was 0.060. In the multicollinearity test the catch and length of time at sea are not related to each other or there is no multicollinearity and each factor fulfills the requirements where the tolerance value is  $> 0.1$  and the VIF value is  $< 10$ . In the multiple regression test, the factor equations show a positive relationship, which means that each factor increases both the catch and the length of time at sea, so the amount of ice carried also increases. Based on the results of the F test (ANOVA) it was stated that each factor of fishing time and catch had a strong effect on the amount of ice on the gill net vessels carried. The coefficient of determination (R<sup>2</sup>) obtained is 88% while the remaining 12% is thought to be influenced by other variables not included in the model, such as ice quality, hatch quality, etc.

Furthermore, to determine which factor has the most dominant effect on the amount of ice in the fleet of gill net vessels carried, a T-test is carried out. The longer you go to sea or operate the sondong fleet, the more ice is needed. The more caught in the sondong fleet, the more ice is needed. In line with the research conducted (Fajriati, 2021), namely the longer the fishing trip, the more catches you will get. And also the more the catch, the amount of ice needed by fishermen will increase to maintain the quality of the catch.

#### 4. Conclusion

Based on the results of the research analysis above, it can be concluded that the factors of ship size, length of time at sea, and engine power have a strong influence on the amount of fuel carried based on the F test with a confidence level (coefficient of determination) of 87.1%. Among these factors that greatly influence the number of marine fuel supplies on the sondong according to the T-test is the length of time at sea, followed by engine power and ship size. Whereas for ice supplies, the factors of length of time at sea and catch are very influential on the amount of ice carried with a confidence level (coefficient of determination) of 46.7%. Based on the T-test, the most dominant influence on the amount of ice carried on the sondong boat was the length of time at sea followed by the catch.

As for the net boat, the factors of ship size, length of time at sea, and engine power have a strong influence on the amount of fuel carried based on the F test with a confidence level (coefficient of determination) of 91.5%. Among these factors that greatly influence the number of marine fuel supplies on net boats based on the T-test is the length of time at sea, followed by engine power and ship size. Meanwhile, in the supply of ice on fishing vessels, the length of time spent at sea and the catch also greatly influences the amount of ice carried with a confidence level (coefficient of determination) of 88%. The most dominant influence on the amount of ice carried on the sondong boat based on the T-test is the length of time at sea followed by the catch.

The sondong and gill net vessels studied had several results in common, namely the most dominant influence where all supplies were the most influential, namely the length of time at sea, both from the sondong and gillnet vessels.

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