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# ANALYSIS OF PRODUCTION FACTORS FOR GILLNET FISHING GEAR AT THE TECHNICAL IMPLEMENTATION UNIT (UPT) OF THE FISHERY PORT OF RIAU PROVINCE

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## ABSTRACT

Dumai City relies entirely on marine waters for its fisheries production, with gillnets being a predominant fishing gear among local fishermen. Gillnets, characterized by their rectangular shape with varying mesh sizes, utilize floats and weights. This study aimed to identify the factors influencing gillnet catches in Dumai City. Results from simultaneous testing revealed that all production factors significantly impact catch quantities. Through multiple linear regression analysis, it was determined which factors exerted positive and negative effects. The regression equation, Y = 0.108 – 0.183 X1 – 0.411 X2 – 0.345 X3 + 0.173 X4 + 0.116 X5 + 0.451 X6 + 0.181 X7 – 0.106 X8 + 0.223 X9, elucidated these relationships. The cumulative effect of production factors on catches amounted to 64.20%. This study provides valuable insights into optimizing gillnet fishing practices in Dumai City's marine environment.

**Keywords:** Multiple linear regression, Production factors, Gillnets, Dumai

## 1. INTRODUCTION

Dumai City is one of the cities in Riau Province, with an area of 1.727,38 km2 and a sea area of 1.302,40 $km^2$. The fishing status in Dumai City is excellent. Almost all production comes from fishing at sea, with a percentage of around 93%, and the rest comes from aquaculture and other fisheries. In 2019, the potential of fisheries in Dumai Waters was considerable at 650.88 kg or 68.52%. In 2020, fisheries' potential in Dumai waters decreased by 585.79 kg or 67.08%. However, in 2021, the potential of fisheries in Dumai waters will increase to 710.57 kg or 71.08%[1].

Improving fish production performance supports fisheries efforts that generate income, including capital and labor methods. The production function shows the relationship between the quantity of production factors and the yield achieved. Understanding the drivers of production in fishing activities can improve efficiency, reduce production costs, and increase catches[2].

The Riau Province Fishery Port Technical Implementation Unit (UPT), formerly known as the Fish Landing Place (TPI), is one of the ports and fishery centers that function as facilitation of fisheries production, processing, marketing of marine products and development of fishing communities in Dumai City. City residents work as fishermen with 56 sondong fishing gear, 72 nets, and 10 splints.

A gill net is a fishing gear consisting of a rectangular net with the same mesh size throughout, a float at the top of the net, and a weight at the bottom. The mesh size is adjusted to the type and size of the target fish being caught[3]. A gill net is set vertically to prevent fish from swimming. When catching fish, the fish can be entangled at the bottom of the gillnet lid or caught in the net body consisting of one, two, and three layers.

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Fishery production factors strongly influence catches. Production factors make it possible to improve fisheries efficiency and achieve optimal yields. Production activity is the process of converting inputs into outputs. The production activity of a fishing unit is the process by which inputs in the form of factors of production are converted into outputs in the form of catches. According to Raharjo[4], to increase and improve inputs, it is necessary to know the production factors that affect the catch and achieve optimal production. Thus, it is expected that the amount of fish finally obtained will increase, and the welfare of fishermen will also increase.

The previous study of Sofia[5] revealed that production factors that influence the operation of gill nets are ship tonnage, fishermen's experience, amount of fuel, actual time of gear operation, fishing trip, ship age, and number of gear sets. Meanwhile, according to Setiawati et al.[6], production factors that affect the catch are the length of the net, the amount of fuel, the length of immersing, the number of settings, and the number of crew members. In a study by Juliastuti et al.[7], the critical production factors affecting catches in gill net fishing gear include fuel quantity, labor input, fishing gear quantity, boat size, engine power, immersion length, and fishermen's experience. According to Setyaningsih et al.[8], the study highlights the key factors affecting gill net fishing gear, including the number of settings, net length, and fishermen's experience. Meanwhile, based on a study by Kusumasuci et al.[2], the production factors of several settings, net length, fishermen's experience, and fuel consumption collectively impact fish catch significantly.

Based on the explanation above and several previous studies, several production factors such as the number of crew members (people), the amount of fuel (L), ship tonnage (GT), engine power (PK), net length (m), net width (m), mesh size (inches), fishing ground distance (miles), Immersing time (hours), which are known to affect the catch. A production factor must be present in production (in this case, the catch of the net landed at the Riau Provincial Fishing Port UPT). Optimal production growth is achieved through effective Utilization of production factors. By considering the impact of factors that affect production, it is clear that production factors must be used as efficiently as possible. Based on this, it is vital to research and analyze net fishing gear production factors at the Riau Province Fisheries Port Unit.

## 2. RESEARCH METHOD

### Time and Place

The research was conducted from July 27 to August 20, 2022. The research was conducted in the waters of Dumai, precisely at the Riau Province Fishery Port UPT.

### Methods

The survey method was used in this research. The sampling method uses the census method.

### Procedures

First, identify the problem of catch production at the Riau Province Fisheries Port UPT. Then, a literature survey will be conducted to obtain information about fishing conditions, fishing gear, catches, and other data available at the Fisheries Port Unit in Riau. This survey includes preliminary data. Prepare tools and materials and then collect primary and secondary data related to production factors. Then, the data was analyzed. The results of the analysis are described in the results, and whether the catch's production factors have an effect is discussed.

### Data Analysis

#### Reliability Test and Validity Test

According to Ghozali[9], the reliability test is a test that measures a single variable index, namely the questionnaire. A survey is considered reliable if the answers to the questions asked are consistent or stable over time. The Cronbach Alpha (α) statistical test is used to check reliability. Variables are reliable if the Cronbach alpha (α) value exceeds 0.70. This reliability test was carried out using SPSS 22.0 for Windows. Apart from using the SPSS 22.0 Windows application, the Alpha-Cronbach formula Wahyuning[10] can be used to calculate the reliability test.

$$r_{11} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\sum \sigma_t^2}{\sigma_t^2}\right)$$

Description:

$r_{11}$ = reliability sought
n = number of question items tested
$\sum \sigma_t^2$ = Total variance of each item score
$\sigma_t^2$ = Total variance

The validity test measures the importance of a survey. Bivariate person correlation and corrected total item correlation are often used to test validity. Question items are significantly related to the total score if r count ≥ r table (two-sided test with a significance level of 0.05) (verified). The correlation formula Wahyuning[10] can calculate the validity test as follows.

$$r_{xy} = \frac{N(\sum xy) - (\sum x)(\sum y)}{\sqrt{\{N\sum x^2 - (\sum x)^2\}\{N\sum y^2 - (\sum y)^2\}}}$$

Description:

$r_{xy}$ = correlation coefficient between variable X and variable Y
$\sum xy$ = the number of multiplications between variables X and Y
$\sum X^2$ = the sum of the squares of X values
$\sum y^2$ = the sum of squares of Y values
$(\sum x)^2$ = the sum of the X values then squared
$(\sum x)^2$ = the sum of the Y values then squared

**Multiple Regression Function**

Multiple regression is a test that uses several independent variables to determine the direction and effect of the independent variable on the dependent variable. The general form of a multiple regression model with k independent variables[11] is as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \varepsilon$$

From the regression model above the following are the results of the regression model for this study:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9$$

Description:

Y = dependent variable (catch)
$\beta_0$-$\beta_9$ = population parameters
$X_1 - X_9$ = independent variables
$X_1$ = net length (m)
$X_2$ = net width (m)
$X_3$ = mesh size (inches)
$X_4$ = fishing ground distance (miles)
$X_5$ = immersing time (hours)
$X_6$ = number of crew (person)
$X_7$ = vessel tonnage (GT)
$X_8$ = engine power (PK)
$X_9$ = amount of fuel (L)

**Coefficient of Determination ($R^2$)**

The coefficient of determination measures how well the model explains the variation in the dependent variable. R-squared ranges from 0 to 1. A small $R^2$ value means that the ability of the independent variables to explain the variation in the dependent variable is minimal. A value close to 1 means that the independent variables provide almost all the information needed to predict the variation in the dependent variable[9].

The coefficient of determination can be calculated using the formula[10] as follows.

$$R = \frac{n\sum XY - \sum X \sum Y}{\sqrt{\{n\sum X^2 - (\sum X)^2\}\{n\sum Y^2 - (\sum Y)^2\}}}$$

The coefficient of determination ($R^2$), which shows the difference between the variance of the measurement data Yi and the variance of the values on the regression line for the values Xi, is determined from R.

## 3. RESULT AND DISCUSSION

**General Situation of the Research Location**

Dumai City is located between 1°23'00" and 1°24'23" North latitude and 101°23'37" and 101°28'13" East Longitude. Dumai City occupies an area of 1,727.38

km$^2$. It borders the Rupat Strait to the north, Bandar Laksamana District of Benkalis Regency to the east, Batin Solapan District of Benkalis Regency to the south, and borders Tanah Putih District, Melawan District, Rimba Melintang District, Batu Hampar District, Bangko District, Sinaboi District, and Rokan Hilir Regency to the west[1].

The Riau Provincial Fishing Port Technical Implementation Unit (UPT), previously known as the Fish Landing Base (PPI), is the only fishing port in Dumai City and is located in Pangkalan Sesai Village, West Dumai District, approximately 2 km from Dumai City. The area is about 10,000 square meters (Ha). UPT Pelabuhan Perikanan Riau Province is a type D fishing port called a TPI (Fish Auction Place). UPT Fishing Port Riau Province serves as a place for fishermen to carry out fishing activities ranging from restocking fish stocks to landing catches and conducting auctions.

**Gill Net Fishing Gear**

The gill net fishing gear in the Riau Provincial Fishing Port UPT consists of a net body, dance ris, buoys and weights, and a rope sheet. The net body is rectangular, made of transparent Tangsi material, and a trap for catching fish. Two types of floats are used in this net: peluntang (marker floats) and floats. Peluntang is a buoy of 20 cm diameter white polyvinyl chloride (PVC) attached to the top of the net. The distance between the peluntang is 15 m. Buoys or child buoys are red buoys attached to the buoy rope at a distance of 1,5 m. This buoy is made of polyvinyl chloride (PVC). The ballast consists of 20 g of lead and is attached to the ballast rope at a distance of 48 cm. The ris rope used is made of nylon/polyethylene (PE) and has a length of 1500 me. The upper ris rope was used to hang the net body and float rope. The lower ris rope is used to hang the net body and ballast rope. Sheet rope is the rope that connects the end of the fishing gear to the boat. Sheet rope with a marker buoy is also attached to the end of the gillnet. The sheet rope used is 25-50 meters long, and the material is nylon.

**Catch Results of Gill Net Fishing Gear**

The maximum fish catch landed at the Riau Provincial Fishing Port UPT is 296 kg. The minimum catch is 55 kg; fish caught by fishermen are senangin (*Eleutheronema tetradactylum*), pomfret (*Bramidae*), lomek (*Harpadon nehereus*), talang (*Scomberoides lysan*), parang-parang (*Chirocentridae* sp), tenggiri (*Scomberomurus* sp), terubuk (*Tenualosa toli*), gulama (*Pseudocienna amovensis*), shark (*Selachimorpha*), stingray (*Bataidea*), duri (*Hexanematichtys sagor*), biang (*Steppina* sp), snapper (*Lates calcarifer*), selidah (*Cynoglossus lida*), malung (*Muraenesox cinereus*), tohok (*Scimberomus guttatus*), debok (*Pomadasis* sp), kelampai, beliak (*Ilisha elogata*), jenak (*Lutjanus argentimaculatus*), ajjah (*Plicofollis argyropleuron*), gerut (*Pomadasys andamnensis*), caping (*Sphyrna lewini*), senunggang (*Nemiperus hexodom*), and caru (*Torpedo scad*).

**Reliability and Validity Test**

Cronbach alpha based on normalized items is 0.777 or 77.7%. Based on the criteria, variables with a Cronbach alpha (α) value> 0.70 are considered reliable. A value of 0.77> 0.70 means that the variables for this test are reliable. The value of the r table is 0.1388. The values of net length (0.441 > 0.1388), net width (0.655 > 0.1388), mesh size (0.601 > 0.1388), fishing ground distance (0.483 > 0.1388), immersing time (0.220 > 0, 1388), number of crew (0.428 > 0.1388), vessel tonnage (0.662 > 0.1388), engine power (0.326 > 0.1388), and amount of fuel (0.636 > 0.1388) which means that the items are valid.

**Multicollinearity Test**

From the results in Table 3 in the collinearity statistics column below, the independent variables are net length (X1), net width (X2), mesh size (X3), fishing

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ground distance (X4), immersion time (X5) and number of crew (X6), Ship Tonnage (X7), Engine Power (X8), Total Fuel (X9) resulting in VIF values that do not exceed 10 and tolerance values not lower than 0.1. From this, this regression model does not show any multicollinearity among the independent variables.

### Autocorrelation Test

The value of the DW table with a significance of 0.05 is dl = 1.6754 and du = 1.8632. The calculated DW value can be seen in Table 1 below. The condition that no autocorrelation occurs is:

dU < dw < 4 - dU

1,8632 < 2,016 < 4 - 1,8632

1,8632 < 2,016 < 2,1368

It can be concluded that there is no correlation between the variable values and the autocorrelation test.

### Heteroscedasticity Test

Based on the scatterplot in Figure 2, the points are randomly distributed above and below 0 on the Y-axis. From this, it can be concluded that the residuals generated by the regression model show uniform diversity. Therefore, the heteroscedasticity test is met.

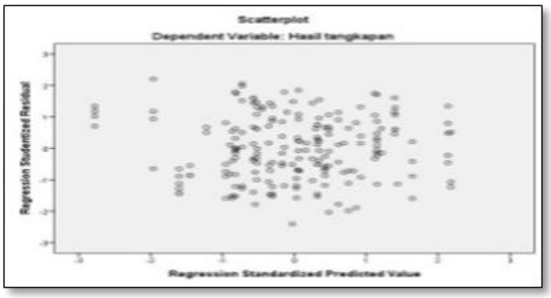


**Figure 2.** Results of the Heteroscedasticity Test

**Table 1.** Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | 0,801[a] | 0,642 | 0,625 | 0,13201 | 2,016 |

**Table 2.** Anova

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 5,929 | 9 | 0,659 | 37,807 | 0,000[b] |
| | Residual | 3,311 | 190 | 0,017 | | |
| | Total | 9,240 | 199 | | | |

**Table 3.** Coefficients

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | 0,108 | 0,034 | | 3,197 | 0,002 | | |
| | Mesh length | -0,183 | 0,046 | -0,206 | -4,004 | 0,000 | 0,711 | 1,406 |
| | Mesh width | -0,411 | 0,055 | -0,522 | -7,470 | 0,000 | 0,386 | 2,592 |
| | Mesh size | -0,345 | 0,070 | -0,318 | -4,937 | 0,000 | 0,456 | 2,195 |
| | Fishing ground distance | 0,173 | 0,040 | 0,238 | 4,348 | 0,000 | 0,632 | 1,583 |
| | Duration of immersing | 0,116 | 0,043 | 0,173 | 2,723 | 0,007 | 0,467 | 2,143 |
| | Number of crew | 0,451 | 0,040 | 0,619 | 11,193 | 0,000 | 0,617 | 1,620 |
| | Boat size | 0,181 | 0,055 | 0,202 | 3,283 | 0,001 | 0,496 | 2,017 |
| | Engine power | -0,106 | 0,040 | -0,149 | -2,617 | 0,010 | 0,584 | 1,714 |
| | Amount of fuel | 0,223 | 0,057 | 0,239 | 3,909 | 0,000 | 0,507 | 1,974 |

The t-table value with a significant 0.05 is 1.973. The effect of each production factor is as follows. The test result of the net length factor is -4.004 with a significance of 0,000. The value of 4.004 > 1.973 and 0.000 < 0.05 sig. (α = 5%) means that the net length has a significant effect on the catch. This is because the net length's size determines the fishing range's width, which can increase the catch. However, this factor produces a negative value, which means that the effect of the net length factor is negative. According to Sudirman & Mallawa[12], the net length (the number of nets used) varies depending on conditions, fishing operations, vessel capacity, etc. The number of meshes used affects the catch. The number of meshes used affects the catch that can be achieved.

Partial test results on the net width factor amounted to -7,470 with a significance of 0,000. The value of 7.470 > 1.973 and 0,000 < 0.05 sig. (α = 5%) means that net width has a significant effect on catch. This is because the width of the net determines the depth of the fishing area and can increase the catch. However, this factor produces a negative value, which means that the effect of the net width factor is negative. According to Sudirman & Mallawa[12], the floating layer of the target fish species can be estimated. This is estimated based on the experience passed down by fishermen for generations. In practice, it is first necessary to know the swimming depth of the desired fish species and then determine the net height for use.

The mesh coefficient examination was -4.937, with a significance of 0.000. The sign value of 4.937 > 1.973 and 0.000 < 0.05 (α = 5%) means that the mesh size dramatically affects the catch. The mesh size determines the size of the fish that can be caught. However, this factor produces a negative value, which means that the effect of the mesh size factor is negative. According to Sudirman & Mallawa[12], to achieve high catches in a fishery, the mesh size must be adjusted to the body size of the most common fish in the fishery.

The Fishing ground distance coefficient test result is 4.348 with a significance of 0,000. The sign of the value 4.348 > 1.973 and 0.000 < 0.05 (α = 5%) means that the distance to the fishing ground significantly affects the catch. The effect of fishing distance on fish catch in Dumai is caused by oceanographic factors related to fish habitat. According to Setyaningsih et al.[8], fishing grounds are areas of water where schools of fish congregate and where the best catches can be expected. Fishing success depends on knowledge and selection of fishing grounds, taking into account the accessibility of the area.

Partial test results on the immersing length factor amounted to 2.723 with a significance of 0.007. The value of 2.723 > 1.973 and 0,007 < 0.05 sig. (α = 5%) means that immersing time has a significant effect on the number of catches. This is because the longer the net is immersed; the more and more opportunities there are for fish to be caught.

The test result for the number of crew members' factor is 11.193 with a significance of 0.000. The value of 11.193 > 1.973 and 0.000 < 0.05 sig. (α = 5%), this means that the number of crew members significantly affects the catch. The number of crew members affects the lifting and transportation, and in the case of gillnet fishing, the more the crew members, the faster the work is done. According to Sulandri[133], the number of crew members determines the fishing effort; more crew members will speed up the fishing process and produce a more optimal catch.

The ship tonnage coefficient resulted in 3.283 with a significance of 0.001. The value of 3.283 > 1.73 and 0,001 < 0.05 sig. (α=5%) which means that ship tonnage has a significant effect on catches. Ship tonnage determines how much fish can be accommodated and how much fish can be caught by fishermen. According to Suryana & Raharjo[14], the shape and tonnage of the ship affect its strength when at sea; for example, the higher the GT of the ship, the greater the catch will be.

The engine power factor is -2.617, with a significance of 0.010. The value of 2.617>1.973 and 0.010<0.05 (α=5%) means engine power significantly affects catches. This is because engine power affects how fast the boat goes to the fishing area and how fast the boat returns to the fishing area. However, this factor produces a negative value, which means that the effect of the engine power factor is negative. According to Saputri[15], the ship's engine power must follow the ship's tonnage because the use of ship engine power that does not follow the ship's tonnage inhibits the ship's movement speed.

The total fuel factor is 3.909, with a significance of 0,000. The value of 3.909 > 1.973 and 0.000<0.05 (α = 5%) implies a significant influence between the amount of fuel on the catch. This is because the amount of fuel determines the distance traveled to the fishing location. According to Aji et al.[16], fuel consumption during fishing operations affects the vessel's cruising range to the fishing grounds. According to Muna et al.[17], an increase in fuel volume will affect the ship's ability to transport cargo over a longer distance to achieve optimal catch.

## Multiple Regression Equation

In the test results using SPSS, the regression equation is obtained as follows:

$$Y = 0{,}108 - 0{,}183\, X_1 - 0{,}411\, X_2 - 0{,}345 X_3 + 0{,}173\, X_4 + 0{,}116\, X_5 + 0{,}451\, X_6 + 0{,}181\, X_7 - 0{,}106\, X_8 + 0{,}223\, X_9$$

According to Ghozali[9], the regression equation above can be interpreted as follows. The constant value (a) in the regression equation above is 0,108, which means that if the length of the net, the width of the net, the size of the mesh, the distance of the fishing ground, the length of immersing, the number of crew members, the tonnage of the ship, the engine power, and the amount of fuel are considered constant, then the catch of fishermen who land the catch at the Riau Province Fishing Port UPT is equal to the value of a, namely 0,108.

The regression coefficient value of net length ($X_1$) is -0,183. In this case, if the length of the net increases by 1 meter and the other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fisheries Port, UPT decreases by 0.183. In this case, there is no need to increase the net length. The coefficient effect is harmful because, considering the small tonnage of fishing boats, if the length of the net is increased, it will exceed the ship's capacity. Also, if the use of net length is increased, it will make it difficult for fishermen to carry out fishing operations. The area used by fishermen to operate is where passing tankers navigate, and if they collide with ships, they can damage fishermen's nets.

The regression coefficient value of net width ($X_2$) is -0.411. In this case, if the width of the net increases by 1 m and the other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT can decrease by 0.411. In this case, there is no need to increase the use of net width. This is because Dumai waters are shallow, and when viewed from the catch, the fish obtained are demersal fish. According to Yulianto et al.[18], demersal fish have a swimming layer of 1-3 m above the bottom of the water. According to Sudirman & Mallawa[12], the net width of basic gill nets in certain positions is no more than 7 m.

The regression coefficient value of mesh size ($X_3$) is -0,345. In this case, if the mesh size increases by 1 inch and other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT will decrease by 0,345. In this case, the mesh size factor does not need to be added because the size of the fish in Dumai waters is medium-sized, so if you increase the mesh size, it will help the fish escape from the gill net trap. According to Irpan et al.[19] gill nets with large meshes will only catch large fish; large fish will always be heavier, and small meshes will catch large fish with small weights.

The regression coefficient value of fishing ground distance ($X_4$) is 0,173. In this case, if the distance of the fishing ground increases by 1 mile and the other fixed variables do not change, the catch of fishermen landed at the Riau Province Fishing Port UPT can increase by 0,173. This is because if the distance of the fishing ground is increased, the fishermen will have a new fishing area so that it is possible to catch more fish.

The regression coefficient value of the length of immersing ($X_5$) is 0,116. In this case, if the length of immersion increases by 1 hour and the other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT will increase by 0,116. This is because the more time the net is immersed, the more opportunities for fish to be caught. This follows the opinion of Pertiwi et al.[20], which states that the greater the value of the immersion time variable, the greater the catch obtained, and vice versa, and the smaller the value of the immersion time variable, the smaller the catch obtained.

The regression coefficient value of the number of crew members ($X_6$) is 0,451. In this case, if the number of crew members increases by 1 person and other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT can increase by 0,451. This is because the additional number of fishermen participating in the operation of gill net fishing gear will speed up the fishing process, such as when fishermen are setting and hauling. According to Pratama et al.[21], many crew members will facilitate fishing activities by lowering and pulling fishing gear to speed up the fishing process.

The regression coefficient value of ship tonnage ($X_7$) is 0,181. In this case, if the ship's tonnage increases by 1 GT and the other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT can increase by 0.181. This is because if the ship's tonnage is increased, the fishermen can fish further or the fishing area reaches the middle of the sea, and if the increased tonnage of the ship can allow the fishermen to carry larger fishing gear. This follows the opinion of Suryana et al.[14]; the higher the GT of a ship, the more fishing gear can be transported, the further the ship can reach the waters, and the more catches can be obtained.

The regression coefficient value of engine power ($X_8$) is -0.106. In this case, if the engine power increases by 1 PK and the other fixed variables do not change, the catch of fishermen who land fish at the Riau Province Fishing Port UPT can decrease by 0.106. In this case, there is no need to add more engine power. This is because if the engine power is added, the catch will not be affected. After all, the technique of operating the net itself is passive. The opinion of Kurniawan[22] supports this; the technique of operating gillnet fishing is passive (waiting for the fish to become entangled) so that the ship's engine dies.

The regression coefficient value of the amount of fuel ($X_9$) is 0.223. In this case, if the number of fuel increases by 1 L and other fixed variables does not change, the catch of fishermen who land fish at the Riau Province Fishery Port UPT can increase by 0.223. This is because gillnet fishermen who land at the Riau fisheries port UPT always move from place to place when operating, so the addition of fuel will increase the distance traveled. This opinion is also supported by Sulistyowati[23], along with the increasing use of fuel oil (BBM), which is expected to allow fishermen to access fishing grounds more freely.

**Coefficient of Determination ($R^2$)**

In Table 1, the R-squared value is 0,642. The factors of net length, net width, net size, fishing ground distance, immersion time, number of crew members, ship tonnage, engine power, and amount of fuel for fishing contribute to the catch of fishermen who land their catch at the Riau Province Fishery Port UPT by 64,2%. In comparison, the remaining 35,8% is influenced by other factors not discussed in this study.

## 4. CONCLUSION

Production factors that have a significant effect on the catch of nets landed at the Riau Fisheries Port UPT are net length, net width, net size, distance from the fishing area, length of immersion, number of crew members, ship tonnage, engine power, and amount of fuel. Factors that positively affect catch are distance from the fishing area, length of immersion, number of crew, ship tonnage, and amount of fuel. Production factors negatively affecting catch are net length, width, mesh size, and engine power. The effect of net production factors on catch is 0,642 or 64,2%, while the remaining 35,8% comes from other factors not discussed in this study.

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