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ANALYSIS OF CATCH PRODUCTIVITY BASED ON DIFFERENCES IN BAGAN SIZE AT UPTD PPP REGION 1 CAROCOK TARUSAN, WEST SUMATRA PROVINCE

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ABSTRACT

Carocok Tarusan Fishing Port is one of the fishing ports in West Sumatra Province and is a place for fishing activities in Pesisir Selatan Regency with high productivity. Factors that affect the productivity of fishermen include social and economic factors, such as the amount of capital, number of ships, number of workers, distance traveled at sea, and experience. The fishing fleet commonly used is Bagan, with as many as 171 units. Bagan ships in the Carocok Tarusan are dominated by ships measuring ≤30 GT, as many as 162 ships, while those measuring >30 GT are nine ships widely used by fishermen in the Carocok Tarusan Waters are ships measuring ≤30GT. This study aimed to determine the productivity of Bagan Perahu catches based on differences in ship size. This study was conducted from July 2023 to August 2023. The method used in this study was the survey method, with direct observation in the field, conducting interviews with fishermen, and recording the catch using a bagan ship. The types of fish caught using Bagan are Anchovi, Mackerel Scad, and Mackerel Tuna (main catch). Peperek fish, skipjack tuna, Indian Mackerel, Selar fish and Squid (bycatch). Based on the study's results, it can be concluded that in the waters of the Carocok Tarusan, Anchovies are the most commonly caught catch using a boat lift net. Ships measuring 1-10 GT have a higher productivity value than ships measuring 11-20 GT and ships measuring 21-30 GT. With a correlation value (R) approaching 1, the relationship between the dependent variable and the independent variable is stated to be very strong. Meanwhile, the results of multiple linear regression show that 81.14% is influenced by the independent variables (trip, ship size (GT), crew, fuel, and logistics).

Keywords: Bagan, UPTD Carocok, Catch, Productivity

1. INTRODUCTION

Carocok Tarusan Fishing Port is one of the fishing ports in West Sumatra Province and is a place for fishing activities in Pesisir Selatan Regency with high productivity. The fishing fleet operating in Carocok Tarusan Waters Port currently consists of 359 units. The fishing fleet used is 171 Bagan units, 45 Payang units, 113 Tonda units, and 30 Gillnet. The Bagan ships in Carocok Tarusan Port are currently dominated by ships measuring ≤30 gross tonnage (GT), as many as 162 boats, while those measuring >30 GT are nine ships, the ones most used by fishermen in Carocok Tarusan are ships measuring ≤30GT. The shape and size of a boat will affect its strength at sea, such as withstanding waves. In addition, the ship's size affects the ship's movement at sea[1].

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Bagan is a fishing gear operated by lowering it into the water column and lifting it again after there are many fish on it; in its operation, a boat is used to move it to another location where there are estimated many fish[2]. Bagan fishing gear is a fishing gear included in the lift nets classification. It is simple and is used by fishermen. Bagan fishing gear is included in passive fishing gear that uses light as a medium to attract or collect fish[3]. The fish that are the target of Bagan catches are small pelagic fish that have favorable phototaxis properties or types of fish that are attracted to light[4].

Several factors influence fishing productivity. If these factors are maximized, fishing productivity will be high and vice versa[5]. Decree of the Minister of Marine Affairs and Fisheries Number 86/KEPMEN-KP/2016 states that fishing ship productivity is the level of ability to obtain fish catches, which is determined by considering (a) ship tonnage size, (b) ship material used wood or iron/fiber, (c) ship engine power, (d) type of fishing gear used, (e) number of fishing operation trips per year, (f) average catch capacity per trip, and (g) fishing area. The research aims to determine productivity and the factors that influence Bagan's productivity.

2. RESEARCH METHOD

Time and Place

This research was conducted from July 2023 to August 2023 at the UPTD Fisheries Port Carocok Tarusan of Pesisir Selatan Regency, West Sumatra Province.

Methods

This study used a survey method, with direct observation in the field, interviews with fishermen, and recording the catch using bagan boats. The number of Bagan in the Carocok Tarusan Waters measuring ≤30 GT was 162 units; the samples taken in this study were 26 Bagans divided into three categories, namely Bagan size 1-10 GT, Bagan size 11-20 GT, and Bagan size 21-30 GT. The data observed in this study include primary data and secondary data. Primary data were obtained from direct observation and through interviews with the crew. Secondary data were obtained from the Carocok fishing port. The variables analyzed include catch results, net size, crew number, fuel, and logistics. Analysis of variance was used to see the effect of variables on catch results. Multiple linear analysis was used to determine each variable's relationship to the catch's productivity.

Productivity of Bagan Fishing Gear

Decree of the Minister of Marine Affairs and Fisheries Number 86/KEPMEN-KP/2016 states that the productivity of fishing ships is the level of ability to obtain fish catches, which is determined by considering (a) the size of the ship's tonnage, (b) the ship's material used is wood or iron/fiber, (c) the power of the ship's engine, (d) the type of fishing gear used, (e) the number of fishing operation trips per year, (f) the average catch capacity per trip, and (g) the fishing area. The variables observed in this study affect Bagan catches in the form of trip length, ship size, crew, oil fuel, and logistics[6]. The calculation uses the following equation.

$$\text{Trip Productivity: } \frac{\sum Production\ (kg)}{\sum trip}$$

$$\text{GT Productivity: } \frac{\sum Production\ (kg)}{Gross\ Tonnage}$$

$$\text{Crew Productivity: } \frac{\sum Productuin\ (kg)}{\sum Crew}$$

$$\text{Fuel Productivity: } \frac{\sum Production\ (kg)}{\sum Fuel\ (l)}$$

$$\text{Logistic Productivity: } \frac{\sum Production\ (kg)}{\sum logistik\ (Rp)}$$

Multiple Linear Regression Analysis

The regression analysis used is a multiple linear regression analysis. Multiple linear regression analysis determines the relationship between catch results and boat size, time at sea, fuel use, number of crew, and logistics. Regression analysis is a data analysis technique in statistics that is commonly used in studying the relationship between variables and predicting a variable multiple as follows[7]:

$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$

Description:

Y = Production (kg)
A = Constanta
β = Koefisien regresi
X_1 = Trip
X_2 = GT
X_3 = Crew
X_4 = Fuel (L)
X_5 = Logistic (Rp)
e = Standar eror

3. RESULT AND DISCUSSION

Catch Results

Catch results are the number of fish species or other types of marine animals caught during fishing operations. The catch consists of the main catch and bycatch (Table 1).

Table 1. Catch composition

No.	Species	Catch	Catch composition
1.	Anchovy/Stolephorus sp.*)	43.745	26,76
2.	Mackerel Scad/Decapterus spp.*)	50.240	30,74
3.	Mackerel Tuna/*Euthynnus affinis**)	39.980	24,46
4.	Skipjack Tuna/*Katsuwonus pelamis***)	7.245	4,43
5.	Peperek/*Leiognathus equulus***)	7.420	4,54
6.	*Selar/Selaroides leptolepis***)	6.875	4,21
7.	Indian Mackerel/ *Rastrelliger kanagurta***)	6.245	3,82
8.	Squid/Loligo spp**)	1.708	1,04
		163.458	100

Note: *) Main catch **) Bycatch

Table 2. The mean value of Bagan productivity based on the trip, GT, crew, fuel, and logistic

Bagan Size	Trip	GT	Crew	Fuel	Logistic
1 - 10 GT	161,267	452,788	500,957	112,119	0,014
11 - 20 GT	215,272	353,000	575,947	84,72	0,028
21 - 30 GT	1.375,093	375,025	640,129	13,501	0,003

Based on Table 2. The productivity value per trip shows that the average value of a 21-30 GT Bagan trip is greater than that of a 1-10 GT and 11-20 GT Bagan trip. The length of the trip can affect the catch. Factors that affect the size of the trip are fuel and logistics. The longer the trip, the more fuel is used; the longer the trip, the more logistics are needed. The length of the fishing operation trip affects the total catch and the majority of fish per species[9].

The productivity value per GT shows that the average GT value of boats 1-10 GT is greater than that of boats 11-20 GT and 21-30 GT. This is because the size of the ship (GT) can affect the catch. The size of the Bagn can determine the catch from the length of time at sea, the size of the ship, and the fishing zone. The size of the Bagan is also in line with the size of the engine. The larger the size of the Bagan, the larger the engine size. They can get larger fish catches with more considerable engine power than Bagan, which has more minor engine power.

The productivity value per crew shows that the average value of crew for Bagan size 21-30 GT is higher than that for Bagan size 1-10 GT and 11-20 GT. The number of crew can affect the catch. This is because the size of the Bagan requires a crew. The larger the size of the Bagan, the more crew are needed, and the small number of crew does not affect the catch[10]. The crew's experience during their time as fishermen varies because experienced crew members already know the situation and conditions in the fishing process, so they can help with the fishing and produce optimal production. The productivity value per fuel shows that the average fuel value of 1-10 GT ships exceeds the average of 11-20 GT and 21-30 GT Bagans. The amount of fuel can affect the catch because the length of the trip requires fuel oil. The longer the trip, the more fuel is

used. Fuel is used for ship engines so that it affects the use of ship engines and also affects the ship's movement during operation. The more fuel is used, the greater the power of the ship's engine, so the ship's speed is more significant in circling the net and chasing schools of fish[11].

The productivity value per logistics shows that the average value of the logistics cost of 11-20 GT ships is greater than that of 1-10 GT and 21-30 GT ships. The amount of logistics spent can affect the catch. From the research that has been done, several factors that affect sailing logistics are trips, GT, crew, and fuel. The costs incurred in fishing efforts are more significant due to changes in the variable cost components, namely the price of diesel and goods for consumption needs (food)[12]. This is because the longer the trip, the greater the logistics costs incurred. The larger the GT size, the more logistics costs are required; the more crew, the more logistics costs are necessary; and the more fuel, the more logistics are incurred.

Multiple Linear Regression Analysis

This analysis determines the relationship between catch and Bagan size (GT), duration at sea (trip), fuel usage, number of crew members, and logistics. The regression analysis used is linear. Regression analysis is a data analysis technique in general statistics that studies the relationship between variables and predicts a variable[7].

The following is a form of multiple linear analysis used in this study. Shows the coefficient of determination (R2) value of 0.81 obtained a positive value indicating that the percentage of influence of the dependent variable used in the model is 81.35% influenced by the independent variables (trip, GT, crew, fuel, and logistics) while other factors influence 18.65%. The correlation analysis (R) results in this study were 0.90, close to 1, so the relationship between the dependent variable and the independent variable is stated to be very strong.

Table 3. Analysis of varian (ANOVA)

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	5	131276633,7	26255327	17,45318	1,09036
Residual	20	30086581,73	1504329		

In Table 4, the significance level using 5% (significant 5% or 0.05) is a standard measure often used in research. Using a 95% confidence interval, the F count value is 17.45 and the F table value is 2.71 (the F count value is greater than the F table value), meaning that based on the regression test, the observed variables significantly affect the catch. Y = 3.805,44–130,33 X1 + 235,68 X2+158,10 X3+1,997 X4 – 0,001 X5

The results of the equation above can be interpreted as the productivity of Bagan was influenced by five factors that affect the productivity of the fish catch. This analysis shows that the intercept value (a) is 3,805.44, meaning that the five variables observed show that the constant value has a positive effect. The trip coefficient value is -130.33, where the trip has a negative value on the catch. This indicates that every increase of 1 trip unit will reduce the catch productivity by 130.33 on the catch. This is because other influences cause the trip to decrease, such as unstable electricity, damage to the lamp machine during fishing, and limited fishing zones on the ship. In addition, the difference in the number of catches is related to the response to light from the Bagan boat, which uses lights as an aid technology[13].

This shows that the more trips are made, the lower the catch obtained. However, the length of the trip may have a real effect on the catch. On one fishing trip, there are generally two net pulls. Differences in the number of catches in each unit of net pulling time are caused by various factors, but it can be suspected that differences in the number of catches are related to the eating patterns and habits of pelagic fish species.

The ship's GT size coefficient is 235.68, whereas Bagan's GT size has a

positive value for the catch. This shows that every increase of 1 GT unit will increase the productivity of the catch by 235.68 against the catch. In this study, the size of the ship affects the catch, meaning that the larger the Bagan's GT size, the greater the catch. The larger the boat's dimensions, the greater the ability of the ship to carry trawls and other fishing gear; thus, the range of its fishing ground will be wider. In addition, the ship's size also affects the ship's movement at sea, such as its rotating movements[10]. The size of the boat affects the catch. This is because large ships are generally equipped with powerful engines and large nets, which can accommodate more catches[11]. Operating fishing gear will make the fishing process more manageable, which can indirectly increase the catch.

The coefficient crew is 158.10, where the number of ship crew has a positive value for the catch. This shows that every increase of 1 unit of crew will increase the productivity of the catch by 158.10 against the catch. The more the number of crew and balanced with the ability/skill in sea activities will increase fish catch production. Large ships can generally carry more crew and accommodate more catches[14]. The coefficient value of fuel is 1.997, where fuel has a positive value for the catch. This shows that every increase of 1 unit of fuel will increase the productivity of the catch by 1.997 against the catch. In the study, the fuel used affects the catch; the more fuel is used, the longer the ship's engine can be operated, so the boat has a greater chance of being in the fishing process, and the catch will increase. Fuel is used for ship engines, so it affects the use of ship engines and the movement of ships during operation[11].

The coefficient value of logistics is -0.001, where logistics has a negative value for the catch. This shows that every increase of 1 logistics unit will reduce the productivity of the catch by 0.001 against the catch, meaning that the more logistics used, the results will decrease. In the research conducted in the field, it can be concluded that the income obtained by fishermen does not match the expenditure because there are errors in logistics expenditure during fishing and when selling the catch.

The multiple linear regression analysis results also show that ship size and fuel contribute more to catch productivity compared to other variables. According to research, ship size affects productivity because ship size will affect fishing distance, ship capacity, and ship capability. While fuel will support the ship, the larger the ship size and the farther the fishing distance, the more fuel is needed. Gross tonnage (GT) is a measure that shows the ship's volume to accommodate the results of fishing operations to utilize fishery resources[15].

The larger the ship's dimensions, the greater the ability of the boat to carry trawls and other fishing gear. Thus, the range of its fishing ground will be wider. In addition, the ship's size also affects the ship's movement at sea, such as its rotating movements[10]. Fuel is used for ship engines so that it affects the use of ship engines and also affects the ship's movement during operation. The more fuel is used, the greater the power of the ship's engine, so the ship's speed is more significant in circling the net and catching more fish[11].

4. CONCLUSION

Based on the study's results, it can be concluded that in the waters of Carocok Tarusan, anchovies are the most commonly caught fish using a boat lift net. Ships measuring 1-10 GT have a higher productivity value than ships measuring 11-20 GT and 21-30 GT. With a correlation value (R) approaching 1, the relationship between the dependent variable and the independent variable is stated to be very strong. Meanwhile, the results of multiple linear regression can be concluded that 81.14% is influenced by the independent variable (trip), Bagan size (GT), crew, fuel, and logistics), and other factors that influence 18.86%.

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