Productivity Analysis of Mini Purse Seine in PPI Pulolampes Brebes, Central Java, Indonesia

by Herry Boesono

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Abstract

Fish Landing Base (PPI) Pulolampes is one of fishing base mini purse seine in Brebes Regency, Central Java Province. Many fisher in Brebes more choosing mini purse seine to fishing than other. The problem is about productivity level of this fishing gear. Therefore, the purpose of this study was to analyze many factors which influence weight total catch of mini purse seine and analyzed the productivities. The method apllied is case studies. Sampling method used are simple random sampling. Sampling size determined using Slovin formula and obtained 40 vessels as a sample. The data was analyzed using productivity analysis and factors that influenced catch of mini purse seine using SPSS 22 includes basic assumption test and mult regression analysis. A hypothesis testing consists of normality, multicollinearity, autocorrelation and heterokedastisitas test. Productivity analysis of mini purse seine by gross tonnage (GT) obtained the value - average levels of productivity of 1.56. Based on F test is known that all independent variable can influence dependent variable significantly (R^2 95.30 %, $\alpha < 0.05$). T test analysis obtained results that it is only a variable number of trips (X5) that significantly influence the amount of production by the equation $Y = 4.431 + 1.061X5$, if there is an addition of a number of arrests trip by 1 % with assuming that all variables are fixed, there will be additional fisheries production amounted to 1.061 %.

Keywords: Mini Purse Seine ; productivity.

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1. Introduction

Jaring lingkar (purse seine) is a fishing nets which are assembled and used to catch schooling fishes by circling, so the fish can not escape either from the side or from below (Wahyono, 2003). According BBPPI (2008), *pukat cincin mini* (mini purse seine) has a length of less than 300 m. Thrive in shallow waters (Java Sea, Malacca Strait, waters east Aceh) or along coastal waters in general (coastal fisheries). According to BSN (2010), the length of the purse seine for small pelagic fish target is less than 400 m.

Fish Landing Base (PPI – *Pangkalan Pendaratan Ikan*) Pulolampes located in the Pulogading village at coordinates 06°51'10.01" latitude and 108°56'56.44" longitude in the subdistrict of Bulakamba, Central Java, Indonesia. According to the Department of Marine and Fisheries in Brebes (2011), the number of fishermen in the PPI Pulolampes in 2011 as many as 1 327 people, while the number of ships as many as 260 units, ie as many as 141 units of motor boats and outboard motors 119 units. Number of mini purse seine fishing gear in PPI Pulolampes 68 units, 1 unit of *arad*, 28 units of *koncong*, 1 unit of *cantrang*, and 2 units of anchovies net. Fish production each year in PPI Pulolampes, both the type and amount of catch, are diverse. In 2014 the number of fishery production amounted to 842 728 kg with a production value of IDR 4 561 802 200 (PPI Pulolampes, 2015).

Productivity can be defined as a combination (compound) of production and activity, wherein the production power is the cause, and the Productivity measures the result of production power. Production power means increased strength, from every element of the production (Ravianto, 1996). According to Minister of Marine and Fishery No. 61 / KEPMEN-KP / 2014, the productivity of fishing boat, have been assigned per Gross tonnage (GT) per year based on the calculation of the number of fish caught per vessel within one year divided by the amount of gross tonnage (GT) the ship concerned.

Based on the fisheries potential in PPI Pulolampes, both from the number of the fleet and the amount of production of mini purse seine the authors are interested in doing research on the fishing gear. This study was conducted in March 2015 that aims to analyze the factors affecting the total weight of the catch and productivity of mini purse seine in PPI Pulolampes Brebes, Central Java.

2. Methodology

The material used in this study is a fishing unit using mini purse seine in PPI Pulolampes Brebes. As for the fishing unit studied was catching unit on mini purse seine which land their catch for one year (January 2014 to December 2014) in the PPI Pulolampes Brebes.

The method used is descriptive method survey is a case study. The cases in this study is about productivity mini purse seine, with allegations of some production factors such as size or tonnage (GT), engine power of the vessel (HP), length of nets (m), the number of ship crew (person) and the number of fishing trips (day). Descriptive survey study is a study that intends to conduct the inspections and measurements of the certain symptoms that focus on solving the problems at the present time. In the studies, the basic theory began to be required but not used as a basis to determine the measurement criteria of the symptoms observed and measured (Abdurahmat, 2007).

The sampling technique in this study are randomly (simple random sampling). The number or size of the sample population of this study was determined by using a formula Slovin and obtained a total sample of 40 vessels. Data collected by observation, interview, literature study and documentation. Data analysis is performed as follows:

2.1. Analysis of productivity

According to the decision of the Minister of Marine and Fishery No. 61 / KEPMEN-KP / 2014, the productivity of fishing vessels defined per gross tonnage (GT) per year based on the calculation of the number of fish caught per vessel within one (1) year divided by the amount of gross tonnage (GT) ship concerned. The formula used is as follows:

- Productivity by GT of Vessel (ton per GT) = $\dfrac{\Sigma \text{ Production}}{\Sigma \text{ Vessel Tonnage}}$ (1)

- Poductivity by HP of engine (ton per HP) = $\dfrac{\Sigma \text{ Production}}{\Sigma \text{ HP of engine}}$ (2)

- Productivity by lenghts of net (ton per m) = $\dfrac{\Sigma \text{ Production}}{\Sigma \text{ Lenghts of net}}$ (3)

- Productivity by total of ship crew (ton per person) = $\dfrac{\Sigma \text{ Production}}{\Sigma \text{ Ship Crew}}$ (4)

- Productivity by trip (ton per day) = $\dfrac{\Sigma \text{ Production}}{\Sigma \text{ Trip}}$ (5)

2.2. Statistical analysis

Statistical test to analyze the factors that affect the total weight of the mini purse seine catches by using multiple regression tests. According Wibisono (2009), regression analysis in which there are more than two variables, namely regression analysis, in which, one dependent variable explained by more than one other independent variables. This analysis is often called multiple regression analysis (multiple linear regression analysis), this relationship is:

$$Y = a_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e$$

where:
Y   = Fisheries Production (ton)
X1 = Vessel Tonnage (GT)
X2 = Engine Power (HP)
X3 = Length of nets (m)
X4 = Total of ship crew (person)
X5 = Number of fishing trip (d)

2.2.1. Simultaneous significance test (Test F)

F statistical test used to determine whether all the independent variables included in the model have influence together - equal to the dependent variable. In the F statistical tests performed hypothesis as follows:
Hypothesis test
H0: All independent variables did not significantly influence the dependent variable.
H1: All independent variables significantly influence the dependent variable.
$\alpha = 0.05$.
Critical areas: H0 is rejected if the p value (sig.) < 0.05

2.2.2. Individual parameter significance test (t test)

T statistical tests conducted to show how far the influence of the independent variables individually in explaining the variation of the dependent variable. At t statistical tests performed hypothesis as follows:
Hypothesis test
H0: The independent variable individually no   significant effect on the dependent variable.
H1: independent variable individually significant   effect on the dependent variable.
$\alpha = 0.05$.
Critical areas: H0 is rejected if the p value (sig.) < 0.05.

3. Results and discussions

Each year, the fish productions in PPI Pulolampes are diverse, in kind and quantity of their catches. The number and value of production is different every year. PPI Pulolampes fish production in the year 2008 to 2014 can be seen in Table 1.

Table 1. Fisheries Production at PPI Pulolamper in 2008 to 2014

Year	Production (kg)	Production value (IDR)
2008	110 328	210 606 800
2009	128 475	362 684 806
2010	108 950	272 539 200
2011	380 182	1 269 925 300
2012	487 593	1 399 487 200
2013	822 337	3 014 575 300
2014	842 728	4 561 802 200

Source: Pangkalan Pendaratan Ikan Pulolampes, 2015

The amount of fish production in the PPI Pulolampes achieve the highest production in 2014 amounted to 842 728 kg with a production value of IDR 4 561 802 200, while the lowest production experienced in 2010 in the amount of 108 950 kg with a production value of IDR 272 539 200. Although the fish production in the PPI Pulolampes achieve the lowest production in 2010 amounted to 108 950 kg with a production value of IDR 272 539 200, but the value of production in 2010 was still higher when compared with the value of production in 2008 is IDR 210 606 800, with a total production of 110 328 kg.

There are several possibilities that could occur, such as in 2010 the price of fish caught from the fishermen jumped higher than usual price, or the possibility of largely catch is kind of fishes with high economic value. Fishery production of mini purse seine based on the type of fish landed in Pulolampes PPI can be seen in Table 2.

Table 2. Mini Purse Seine catch in 2014

No.	Type of fish	Production (kg)
1.	Teri (*Stolephorus* sp.)	308 066
2.	Tembang (*Sardinella* sp.)	24 442
3.	Tiga waja (*Nibea albiflora*)	2 343
4.	Bilis (*Mystacoleucus padangensis*)	49 075
5.	Bloso (*Glossogobius circumpectus*)	27 229
6.	Serinding (*Ambasius marianus*)	1 987
7.	Kembung (*Rastrellinger* sp.)	5 380
8.	Rebon (*Acetes indicus*)	450
	Total	418 972

Total fishery production in 2014 based on the type of fish landed in PPI Pulolampes, the most dominant results using mini purse seine fishing gear is anchovy, which amounted to 308 066 kg, while the amount of production that is at least rebon, amounting to 450 kg. Fishery Production Graph of mini purse seine based on the type of fish landed in Pulolampes PPI can be seen in Figure 1.
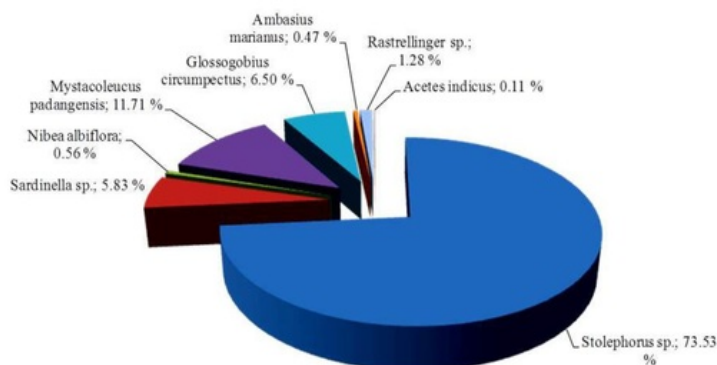
Figure 1. Production of Mini Purse Seine

Based on Figure 1, the predominant type of fish produced by mini purse seine and landed in Pulolampes 2014 PPI is a type of pelagic fish, especially small pelagic fish. Anchovy (*Stolephorus* sp.) is the highest number of fish, amounting to 73.53 %. While the smallest number is Rebon (*Acetes indicus*) is 0.11 %.

3.1. Fishery production factor in Mini Purse Seine

There are some things on the fishing effort using mini purse seine affecting the production produced. Some of the factors that affect production using mini purse seine fishery can be seen in Table 3.

Table 3.Production factors value of Mini Purse Seine

No.	Variable	Mini Purse Seine
1.	Averages of Gross Tonnage (GT)	7
2.	Averages of Engine Power (HP)	118
3.	Averages of Long Nets (m)	305
4.	Averages of Crew (person)	18
5.	Averages of Fishing Trip (d)	37

3.2. Productivity Mini Purse Seine

According to Minister of Marine and Fishery No.61/KEPMEN-KP/2014 on the productivity of the fishing vessel where the level of productivity of purse seine operations in the North Sea that Java is 1.20. Based on the production value factors, mini purse seine productivity calculation in Pulolampes PPI can be seen from reference to the method of calculating productivity of fishing vessels according to the decision of the Minister of Marine and Fishery No.61/KEPMEN-KP/2014. Productivity levels of mini purse seine, which land their catch in PPI Pulolampes Brebes, each factor of production can be seen in Table 4.

Table 4. Average rate productivity of Mini Purse Seine

No.	Productivity	Mini Purse Seine
1.	By Gross Tonnage (ton / GT)	1.56
2.	By Engine Power (ton / HP)	0.09
3.	By Long Nets (ton / m)	0.03
4.	By Crew (ton / person)	0.57
5.	By Fishing Trip (ton / day)	0.29

Based on the results of research conducted, the average level of productivity of mini purse seine (per GT) that land their catch in PPI Pulolampes Brebes is at 1.56, it means that production which is generated for one year average of 1.56 per ton one GT vessels used. It can be concluded that the level of productivity of mini purse seine vessels in Pulolampes exceed productivity levels recommended by the Ministry of Maritime Affairs and Fisheries.

3.3. Analysis capture tools mini purse seine

Based on the results of multiple regression analysis obtain results for determination coefficient of 0.953. This shows that 95.30 % dependent variable (fish production) can be explained by the variation of 5 independent variables (tonnage, engine power, length of nets, number of crew, number of trips). While the remaining 4.70 % is explained by other factors outside the model. F test result is obtained, calculated F value of 138.06 with a significant level of 0.000. Because the probability is smaller than 0.05, it simultaneously across the independent variables significantly influence the dependent variable (fish production).

The relationship between independent variables and the dependent variable indicated by each coefficient value of variable tonnage (0.345), the power of the engine (0.276), length of nets (0.648), the number of crew (0.653), the number of trip (0.000). If the independent variable increases, so that the dependent variable also increased, conversely, if the independent variable decreases cosequently the dependent variable also decreased. Based on the test results of each independent variable (tonnage, power boats, nets length, number of crew, number of trips) to dependent variable (fish production), then the regression equation (independent variables were not significant are not included in the equation) as follows:

$$Y = 4.431 + 1.061 X_5$$

Based on the five independent variables included in the regression model, there is only variable number of trips (X5) which has significant influence with the elasticity of 1.061. So, if there is the addition of a number of arrests trip by 1 % assuming all variables remain, there will be an increase fisheries production amounted to 1.061 %. This shows that the number of arrests trip is a very influential factor in a fishing business. The more trip arrests were made, and then the chances of getting the catches will be more. According to Purnomo (2012), the number of trips per year have a direct relationship and very closely to productivity.

4. Conclusion

The conclusions that can be drawn from this study are the factors of production that used as variables in the study, only the variable numbers of trips (X5) which individually have a significant effect, but simultaneously, all factors of production have a significant effect on production / mini purse seine catches. Based on the calculation of the productivity level accordance to KEPMEN KP No.61/2014, the average levels of mini purse seine productivity that land their catch in PPI Pulolampes Brebes is 1.56, means that production which is generated in one year average of 1.56 ton per 1 GT vessels used.

Referring to the high level of productivity of mini purse seine in PPI Pulolampes Brebes, it is essential if there is related control fishing effort undertaken. One of them is fishing gear used, should refer to the technical provisions of the existing ones. It is necessary to study more about other factors that affect the production of mini purse seine.

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