



Contribution Analysis of Capture Fisheries to the Development of Indramayu Regency West Java

Asep Agus Handaka Suryana¹, Rizky Adikusuma², Iis Rostini¹, Achmad Rizal¹

¹Lecturer of Fisheries and Marine Science Faculty, University of Padjadjaran

²Bachelor of Fisheries and Marine Science Faculty, University of Padjadjaran

Email address:

rizkyadi062@gmail.com

Abstract

The purpose of this research is to analyze the contribution of capture fisheries sector in development of Indramayu Regency and to find out what factors influence capture fisheries' GDRP in Indramayu Regency. The research was conducted in Indramayu Sub-district, Indramayu Regency West Java on September 2017 until October 2018. Data used in this research was secondary data. Conducted analysis were growth analysis, market power analysis using Trade Area Capture and Pull Factor method, and Multiple Linear Regression Analysis to analyze what factors influence capture fisheries' GDRP in Indramayu Regency. Growth Analysis shows the growth of capture fisheries in the amount of 81,20 percent from the year basis. Value of TAC shows bigger number than population and value of PF shows 1,01 determine that capture fisheries market in Indramayu Regency is able to capture opportunities from other regions. Number of fishermen, number of ships, and number of catching devices influence Indramayu Regency's GDRP for capture fisheries in the amount of 20,9 percent.

Keywords: GDRP, capture fisheries, Pull Factor, Trade Area Capture, Sector growth

Introduction

Indonesia is a maritime country, maritime country according to Directorate General of Sea Transportation Ministry of Transportation is a country whose sea area is wider than its land area. Indonesia also has rich marine resources. Rich marine resources should be used as well as possible for the well-being of the people. Utilization of marine resources must also be carried out as wisely as possible so that these marine resources can be sustainable (Syarif 2014).

Indramayu Regency is one of Indonesian regency which borders with the sea. Indramayu Regency is located in north coast of Java with 114,1 km coastline. There are 35.929 fishermen in Indramayu. Fishermen live in almost every

region in Indramayu District. The catch that dominate in Indramayu Regency are red snapper, mackerel, mackerel tuna, and squid. (Syarif 2014).

Indramayu Regency is the regency which has the largest fish produces in West Java Province. Fisheries in Indramayu Regency gives the third largest contribution towards Gross Regional Domestic Product (GRDP) after trading and farming. According to Ministry of Maritime Affairs and Fisheries of Indramayu Regency, fisheries sector gave Rp. 464.529.060.185 towards its GRDP as of 2017. Fisheries sector gave 61,61% contribution towards West Java's fisheries GDP as of 2017, according to Central Statistics Agency of Indramayu (Handayani 2017).

The capture fisheries sector in Indramayu is expected to

contribute to the economic growth of Indramayu Regency. Natural resources, human resources, technological resources and institutional especially fisheries institutional are the drivers for fisheries development. Indramayu Regency has a potential as the center of fisheries production. Indramayu Regency has two main sectors as its economy potential, namely oil and gas sector for 24,6 % and fisheries sector for 24,4 %. Capture fisheries also contributed towards fisheries production in Indramayu Regency for 40,54 % (Syarif 2014).

The potential of the capture fisheries subsector in Indramayu Regency includes fish resources, human resources, institutions and technology. These factors must always be considered in efforts to develop the capture fisheries subsector in order to achieve success. The success of the development will provide a sizeable contribution to the regional economy which will serve as the basis for determining development priorities.

The role of the regional economy can be seen from the Gross Regional Domestic Product (GRDP) in Indramayu Regency. Capture fisheries contributed 40,54% of the total fishery products in Indramayu Regency (Syarif 2014). Handayani (2017) stated that the Indramayu capture fisheries sub-sector contributed 61,61% to the West Java Province's GRDP. Data from the Office of Maritime Affairs and Fisheries of Indramayu Regency shows that the capture fisheries production continues to increase from 2014.

The explanation above can explain that the fisheries sector, especially capture fisheries, is one of the two main sectors that has potential economic in Indramayu. In connection with the above, it is important to conduct a detailed study of the contribution of the capture fisheries sector to the development of the Indramayu Regency and the factors that influence the growth of the capture fisheries sector in the Indramayu Regency.

The purpose of this research is to analyze the growth of the contribution of the capture fisheries sector to the economy and development in Indramayu Regency and determine the factors that influence the capture fisheries GRDP of Indramayu Regency.

DATA AND APPROACH

Research activities regarding the contribution of capture fisheries in Indramayu Regency were conducted in September 2017-October 2018. The research was conducted in Indramayu Regency, West Java. The method used in this research is quantitative descriptive method. This method is a method that conducts an investigation in obtaining facts

from the data by using numbers to describe individual and group characteristics (Syamsudin 2011). The data used in the research were obtained from the Fisheries and Maritime Services Office of Indramayu Regency and the Fisheries and Maritime Services Office of West Java Province. Data was also obtained from Central Statistics Agency of Indramayu Regency and the Central Statistics Agency of West Java Province.

The type of data collected is sourced from secondary data. Secondary data is research data obtained indirectly from another sources such as books, journals, archives, internet, and documents. Data was obtained from reports, archives, internet, and documents in Padjadjaran University, data from Fisheries and Maritime Services Office of Indramayu Regency and the Fisheries and Maritime Services Office of West Java Province, Central Statistic Agency of Indramayu Regency and Central Statistic Agency of West. The data used are Capture Fisheries Sector GRDP, Fisheries Sector GRDP in the base year, the value of fishery commodity sales in Indramayu, the value of fishery commodity sales in West Java, Indramayu's per capita income, West Java's per capita income, and the population in Indramayu Regency

DATA ANALYSIS METHOD

Growth Analysis of Contribution of Capture Fisheries

The contribution of fisheries can be analyzed using the sector contribution analysis method using the growth analysis method and the Trade Area Capture and Pull Factor methods.

Growth Analysis

Growth analysis is a method that can be used to measure the contribution of the fisheries sector by observing sector growth observed in a certain period of time (Fauzi 2010). To calculate the growth value of the fisheries sector, a growth analysis formula can be used. The mathematical model is as follows

$$GI_t = \left(\frac{y_{it}}{y_{i \text{ base}}} \right) \times 100$$

Information :

GI_i : The amount of growth in year i

y_{it} : Fisheries GRDP in year i

$y_{i \text{ base}}$: Fisheries GRDP in base year

Trade Area Capture and Pull Factor

The Trade Area Capture is used to measure the market strength of fisheries commodities as well as their links to community socio-economic indicators such as income and purchasing power of the community. The Pull Factor

calculation is used to determine whether the Indramayu Regency capture fisheries market is able to attract customers or lose customers. To measure the linkage of the fisheries sector to economic activities in an area, the Trade Area Capture or TAC and Pull Factor or PF methods can be used.

TAC can be calculated using the following formula :

$$TAC = \frac{AS_a}{PCS_{base} \left(\frac{PCI_a}{PCI_{base}} \right)}$$

Information :

TAC : Trade Area Capture

AS_a : The actual sales value of fisheries commodities in the region *a* (Rupiah)

PCS_{base} : Per capita sales of fish products in the base area (Rupiah)

PCI_a : Per capita income in the region *a* (Rupiah)

PCI_{base} : Per capita income in the basis region (Rupiah)

Pull Factor can be calculated using the following formula :

$$PFa = \frac{TAC_a}{Pa}$$

Information :

PFa : Pull Factor in region *a*

TAC_a : Trade Capture Area in region *a* (Rupiah)

Pa : Population in region *a* (People)

Factor Analysis

Multiple Linear Regression Analysis is an analysis commonly used to determine whether there is a relationship between the independent variable and the dependent variable. The purpose of Multiple Linear Regression Analysis is to find out the average population or the values of the dependent variable based on the value of the known independent variable (Ghozali 2011). Dependent variable is symbolized by the letter Y, while the independent variable is symbolized by the letter X.

Multiple linear regression analysis was used to find out how much influence the independent variables such as the number of catches, the number of fishermen, and the number of ships on the GRDP of fisheries in Indramayu.

The formula for Multiple Linear Regression Analysis is as follows:

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

Keterangan :

Y : Capture Fisheries GRDP (Rupiah)

a : Constanta

b₁ : Regression coefficient between the number of fishermen with GRDP

b₂ : Regression coefficient between the number of ships with GRDP

b₃ : Regression coefficient between the sea time with GRDP

X₁ : Number of ships variable (unit)

X₂ : Number of fishermen variable (people)

X₃ : Number of fishing gear variable (unit)

e : Error disturbance

Classic Assumption Test

Classic Assumption Test is a test conducted to ensure that the multiple linear regression equation that has been made is BLUE namely the Best Linear Unbiased Estimator (Gujarati 2006). Classic Assumption Test is a statistical requirement on the method of multiple linear regression. Classic Assumption Test is carried out to ensure that the independent variables as estimators are not biased towards the dependent variable (Ghozali 2011). Classical Assumption Test can be done by four methods, as follows:

- Normality Test

The normality test aims to test whether in the regression model, confounding or residual variables have a normal distribution. There are two ways to detect whether residuals are normally distributed or not, namely by graphical analysis and statistical tests with the Kolmogorov-Smirnov test. Residuals are normally distributed if they have a significance value greater than 0.05 (Ghozali 2011).

- Multicollinearity Test

Multicollinearity test aims to test whether the regression model found a correlation between independent variables. Multicollinearity Test can be carried out by looking at the value of the Variance Inflation Factor (VIF) or tolerance of each independent variable. The data is free from multicollinearity if the tolerance value is greater than 0.1 or a VIF value is less than 10 (Ghozali 2011).

- Heteroscedasticity Test

Heteroscedasticity test aims to test whether there is an inequality of variance from the residuals of one observation to another in the regression model. Glesjer test method is used to determine heteroscedasticity. Data can be said to be good if there is no heteroscedasticity (Ghozali 2011).

- Autocorrelation Test

Autocorrelation test aims to test whether in the linear regression model there is a correlation between the error of the intruder in a certain period with the error of the intruder in the previous period. Autocorrelation test can be carried out using the Durbin-Watson Method (Ghozali 2011). Autocorrelation is not occurred if the Durbin-Watson score is between -2 and +2 (Ghozali 2011).

F test

The F test basically shows whether all independent or independent variables entered in the model have a joint influence on the dependent variable. In this test also uses a significance level of 5% or 0.05 (Ghozali 2011).

The F test is used to determine whether all independent variables such as the number of catches, the number of fishermen, and the number of ships as a whole have an influence on the development of the capture fisheries sector in Indramayu Regency.

T test

T test is used to show whether all independent or independent variables included in the model have a partial effect on the dependent variable. In this test also uses a significance level of 5% or 0.05 (Ghozali 2011).

T test is used to determine whether all independent variables such as the number of catches, the number of fishermen, and the number of ships partially have an influence on the development of the capture fisheries sector in Indramayu Regency.

Coefficient of Determination Test

The coefficient of determination (R^2) essentially measures how far the model's ability to explain variations in the dependent variable. The coefficient of determination is between zero and one. The closer the R^2 score to 1, the better the model can explain what independent variables affect the dependent variable. (Ghozali 2011).

Coefficient of Determination test in this research is used to determine how far the model's ability to explain the independent variables such as the number of catches, the number of fishermen, and the number of ships to the dependent variable namely GRDP in the capture fisheries sector in Indramayu Regency

RESULT AND DISCUSSION

Growth Analysis

The calculation of the growth analysis of the capture fisheries sector in Indramayu Regency in 2010 to 2016 is presented in figure 1 below.

Figure 1. Growth Analysis of the Fishing Sector of the Indramayu Regency in 2010-2016

Year	Capture Fisheries GRDP (Thousand Rupiah)	Growth Index	Contribution Growth (percent)
2010	1.332.083.650	-	-
(basis)			
2011	1.678.798.450	126,02	26,02

Year	Capture Fisheries GRDP (Thousand Rupiah)	Growth Index	Contribution Growth (percent)
2012	1.678.894.245	126,03	26,03
2013	1.829.994.727	137,37	37,37
2014	2.139.360.710	160,60	60,60
2015	2.463.664.322	184,94	84,94
2016	2.413.781.346	181,20	81,20

Figure 1 above explains that the GRDP growth in the capture fisheries sector in Indramayu Regency continued to increase until 2015. The increase from 2010 to 2015 reached 84.94 percent with a figure of Rp. 1,131,580,672,000. The decline occurred in 2016 with a difference of Rp. 49,882,976,000, so the growth of the contribution of capture fisheries decreased by 3.74 percent to 81.20 percent in 2016.

Trade Area Capture

Trade Area Capture is an indicator used to measure the market strength of capture fisheries commodities as well as their relationship to community income. The TAC essentially measures purchases by local residents as well as outsider.

TAC calculation requires data on the value of capture fisheries commodity sales in Indramayu Regency and West Java Province as a base area. Perramita income of Indramayu Regency and West Java Province is also needed to calculate the TAC. To do the PF calculation, the data needed is the TAC value and the population. TAC calculation is done by the method used by Fauzi (2010). The results of the TAC calculation for the capture fisheries sector of Indramayu Regency in 2010 to 2016 are presented in table 2 below

Figure 2. Trade Area Capture of Indramayu Regency

Year	Citizen	TAC _a
2010	1.668.153	1.766.653
2011	1.675.790	1.526.699
2012	1.683.460	1.575.509
2013	1.697.491	1.691.448
2014	1.708.551	1.827.021
2015	1.718.495	1.532.493
2016	1.728.050	1.733.834
Avg.	1.697.141	1.712.346

Overall, capture fisheries in Indramayu Regency can be said to be able to capture capture fisheries trade opportunities. This is indicated by the average value of TAC that is greater than the average number of residents from 2010 to 2016. The average value of TAC is 1,712,346 with an average population of 1,967,141

Pull Factor

Pull Factor is a follow-up calculation of the TAC which aims to separate purchases from local residents from those from outside the region (Fauzi 2010). PF calculation is done by dividing the TAC by the population. The results of the calculation of capture fisheries PF Indramayu Regency are presented in figure 3

Figure 3. Pull Factor of Indramayu Regency

Year	Citizen	TAC _a	PF _a
2010	1.668.153	1.766.653	1,06
2011	1.675.790	1.526.699	0,91
2012	1.683.460	1.575.509	0,94
2013	1.697.491	1.691.448	0,99
2014	1.708.551	1.827.021	1,07
2015	1.718.495	1.532.493	0,89
2016	1.728.050	1.733.834	1,03
Avg.	1.697.141	1.712.346	1,01

The PF value in figure 3 shows that the Indramayu Regency’s capture fisheries sector was able to attract customers from outside the region in 2010, 2014 and 2016 with a PF value of 1.06 each; 1.07; and 1.03. The PF value in table 4 also shows that the capture fisheries sector in Indramayu Regency lost customers in 2011, 2012, 2013 and 2015 with a PF value of 0.91 each; 0.94; 0.99 and 0.89. The decline in customers from the capture fisheries sector is caused by the decline in pelagic fish production which is the main commodity of fisheries in Indramayu Regency.

Factor Analysis

Multiple Linear Regression Analysis

Factors affecting the number of catches are calculated using multiple linear regression analysis. Multiple Linear Regression Analysis. Multiple Linear Regression Analysis is an analysis commonly used to determine whether there is a relationship between the independent variable and the

dependent variable. The purpose of Multiple Linear Regression Analysis is to find out the average population or the values of the dependent variable based on the value of the known independent variable (Ghozali 2011). The dependent variable is symbolized by the letter Y, while the independent variable is symbolized by the letter X. The resulting regression equation based on multiple linear regression analysis is as follows:

$$Y = 49043704,384 - 1846,652X1 + 133942,218X2 - 12819,263X3 + \epsilon$$

Classic Assumption Testing

Classic Assumption Testing is used to test the multiple linear regression equation Testing model obtained based on the calculation results is an effective equation if used to do the estimation. Tests conducted are normality test, multicollinearity test, heteroscedasticity test and autocorrelation test

Normality Test

Normality test is used to determine whether the data has a normal distribution or not. Data is said to be feasible for multiple linear regression if the data is normally distributed. Testing is done by the Kolmogorov-Smirnov method.

The significance value obtained from the data used is 0.200. This value is greater than the significance level of 5 percent (0.05) so that the data can be said to be normally distributed.

Multicollinearity Test

Multicollinearity Assumption Test is performed to determine whether there is collinearity or not among the independent variables. The method used is to calculate tolerance and VIF. Data is said to not have multicollinearity if the VIF value is below 10 or tolerance value is above 0.10. The results obtained are as follows

Figure 4.	N	Variable	Tolerance	VIF
o.	1	X1	0,644	1,553
Multic	2	X2	0,952	1,051
ollinea	3	X3	0,635	1,575
rity				

Test

Figure 4 above shows the results of the calculation of the tolerance value and the VIF value of the regression used. Tolerance values of all variables are more than 0.1 and VIF values less than 10 indicate no multicollinearity

Heteroscedasticity Test

Heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another. The method used is

the glacier test. Data is said to be free from heteroscedasticity if the significance value or p-value of each independent variable is greater than 0.05. Heteroscedasticity test are presented on figure 5.

Figure 5. Heteroscedasticity Test Result

Independent Variable	Significancy Score
X1	0,243
X2	0,968
X3	0,507

Calculation of figure 5 above shows all independent variables have a significance value of greater than 0.05, so it can be said that the data is free from heteroscedasticity.

Autocorrelation Test

This autocorrelation test aims to test whether in the linear regression model there is a correlation between confounding errors in the previous period. This test is done by looking at the Durbin Watson (DW) values that have been determined. The Durbin-Watson value obtained from the calculations made is 1,272. The value obtained shows the data is free from autocorrelation because it has a value between -2 and 2.

T test

The T test aims to test the hypothesis whether each independent variable independently has an influence on the dependent variable. If the t-value of each independent variable is greater than t-table, then each independent variable has an influence on the dependent variable independently. If the calculated t-value of each independent variable is smaller than t-table, then each independent variable has no influence on the dependent variable independently. T test results are presented in figure 6

Figure 6. T test Result

Variable	T-count	T-table
X1	-0,159	
X2	2,474	2,048
X3	-0,070	

The t test results above show that the variable number of fishermen that the number of fishermen (X1) and the number of fishing gear (X3) partially has no effect on the GRDP (Y). The influential variable is the variable number of ships (X2).

F Test

The F test aims to test the hypothesis whether each independent variable jointly has an influence on the dependent variable. If the f-value of the independent variable

is greater than the f-table, the independent variable has an influence on the dependent variable together. If the f-value of the independent variable is smaller than f-table, the independent variable has no influence on the dependent variable together.

F test results are presented in figure 7

Figure 7. F test results

Variable	F-count	F-table
X1		
X2	3,285	2,048
X3		

The f test results above show that the variables X1 (number of fishermen), X2 (number of boats), and X3 (number of fishing gear) have a joint influence on the GRDP dependent variable (Y)

CONCLUSION

Based on the obtained result, GRDP of the capture fisheries sector in Indramayu Regency from 2010 to 2016 is increased by 81.20%. GDRP of capture fisheries in Indramayu determined by number of fishermen, ships, and fishing gear by 20,8 %.

ACKNOWLEDGEMENT

The author wishes to thank the Fisheries and Marine Services office and Central Bureau of Statistic of Indramayu and West Java.

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