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ELASTICITY OF DEMAND FOR YELLOWFIN TUNA FISH PRODUCTS (*Thunnus albacares*) IN THE PORT OF FISHERIES SAMUDERA NIZAM ZACHMAN, MUARA BARU, NORTH JAKARTA

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ABSTRACT

This research aims to analyze the factors that influence the demand for yellow-fin tuna (Thunnus albacares) and determines the elasticity of demand for yellow-fin tuna (Thunnus albacares) in Nizam Zachman Ocean Fishery Port, Muara Baru, North Jakarta. This study conducted in July 2019 to August 2019. The method used is descriptive analysis method withusing multiple linear regression analysis model, supported by periodic data (time series) for 10 years starting from the year 2009 to 2018. The sampling technique used in this research using primary data by using purposive sampling and secondary data using time series data from the years 2009-2018. The results showed that the factors that influence the demand for fish yellowfin tuna (Thunnus albacares) is the price of fish yellowfin tuna, fish prices kites, fish prices kites, fish prices bigeye tuna, the price of squid, rice prices, per capita income. The results of all price elasticity, cross elasticity and income elasticity in demand for yellow-fin tuna (Thunnus albacares) is inleastis.

Keywords: *Elasticity of Demand, Yellowfin tuna, Nizam Zachman Ocean Fishery Port*

INTRODUCTION

Fishery port as a center of economic development has a very important role in the utilization of fishery resources to support fishermen activities, in order of fish catching and landing also marketing are becoming optimal. The Nizam Zachman Ocean Fishery Port is a type A port and is the largest fishing port in Indonesia (Sam 2012), while its marketing activities are oriented to meet international, national, and local market demands. The catching product that are landed not only come from the sea but also from other areas which are carried out by transportation facility according to Lubis et al. (2010). In 2015, the total fish production in The Nizam Zachman Ocean Fishery Port was 187,519.77 tons with a production value of Rp. 2,885,449,277 (2016 Nizam Zachman PPS).

The landed fish at The Nizam Zachman Ocean Fishery Port can be categorized into two groups, they are tuna group dominated by tuna, marlin and skipjack tuna fish, while fish group from traditional ship is dominated by tuna and mackerel and other fish such as pomfret, squid, and snapper red as fish. Species at The Nizam Zachman Ocean Fishery Port in 2013 - 2015 were dominated by yellowfin tuna (Thunnus albacares) (16.97%) with the largest production value at The Nizam Zachman Ocean Fishery Port Nizam Zachman. The average production value of yellowfin tuna reached Rp. 671 billion. (2016 Nizam Zachman PPS).

The concept of elasticity is used to determine the size of the change in the volume of demand for yellowfin tuna at The Nizam Zachman Ocean Fishery Port as a result of the factors that influence it. According to McEachern, elasticity is a tool used to measure the level of sensitivity of consumers and producers toward price changes (Budi 2009). The elasticity of demand and supply of yellowfin tuna is needed in the effort to increase fisheries development. It is because of the yellowfin tuna is a high-economic fish.

In according to the data by The Nizam Zachman Ocean Fishery Port (2016), in 2015 the amount of production was 11,972.26 tons with a production value of Rp. 68,122,205,2. According to Sukirno (2016), the demand for a person or a community for the product is determined by many factors including the price of the product itself, the price of other products and people's income. Several variables in this study such as the price of yellowfin tuna, the price of bigeye tuna, the price of squid, the price of Flyfish, the price of rice and consumer income.

The elasticity of demand for yellowfin tuna (*Thunnus albacares*) products is very important to be researched, by knowing the elasticity of demand for yellowfin tuna (*Thunnus albacares*) products can be found out that the consumer reaction when the price of yellowfin tuna rises or falls, and can be found out th factors that affect the demand for yellowfin tuna The Nizam Zachman Ocean Fishery Port.

RESEARCH METHODS

The study was conducted during July-August 2019 at the Nizam Zachman Ocean Fisheries Port. The research method used in this study is a quantitative method with a descriptive approach and causality design using periodic data (time series). Quantitative methods using periodic data (time series) for 10 years from 2009-2018. The sampling technique used in this study was purposive sampling.

Types and sources of data are primary and secondary data. Primary data were collected from interview result with respondents, they are buyers in the modern fish market, yellowfin tuna traders and The Nizam Zachman Ocean Fishery Port manager. Secondary data to support this research is time series data for 10 years starting from 2009-2018. Secondary data used in this study include data on demand development for yellowfin tuna, price development data of yellowfin tuna, price development data of bigeye tuna, price development data of squid, price development data of Flyfish, price development data of rice and other supported data.

DATA ANALYZE

Demand Elasticity of Yellowfin Tuna

The regression coefficient testing is tested with three kinds of demand models, which are as follows:

1. Price Elasticity

The amount of price elasticity can be determined using the following formula:

$$Eh = \frac{\%\Delta Qx}{\%\Delta Px} \rightarrow Eh = -\frac{\Delta Qx}{\Delta Px}\frac{P}{Qx}$$

Information:

Eh : Price elasticity of demand
Px : Price of goods X
ΔQx : Change in the number of X requested
ΔPx : Change in the number of goods X price

2. Income Elasticty

The amount of Income elasticity can be determined using the following formula :

$$Ep = \frac{\%\Delta Qx}{\%\Delta I} \rightarrow Ep = \frac{\Delta Qx}{\Delta I}\frac{I}{Qx}$$

Information:
Ep : Income Elasticty
I : Consumer's Income
Qx : Number of items X requested
ΔQx : Change in the number of requests for goods X
ΔI : Change in the consumer income

3. Cross Elasticity

The amount of cross elasticity can be determined using the following formula:

$$Es = \frac{\%\Delta Qx}{\%\Delta Py} \rightarrow Es = \frac{\Delta Qx}{\Delta Py}\frac{Py}{Qx}$$

Information:
Es : Cross Elasticity
Py : Price goods Y
Qx : The number of goods X
ΔQx : Change in the number of requests for goods X
Δpy : Change in the goods X price

Multiple Linear Regression Model (Demand for Yellowfin Tuna)

The multiple linear regression model according to Supranto (2004) can be shown as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + e$$

Information :

y : Demand for yellowfin tuna (Kg/year)
α : Constant
β : Coefficient
X_1 : Price of yellowfin tuna (IDR/year)
X_2 : Price of Flyfish (IDR/year)
X_3 : Price of bigeye tuna (IDR/year))
X_4 : Price of squid (IDR/year)
X_5 : Price of rice (IDR/year)
X_6 : Income per capita (IDR/year))
e : Error

Classic assumption test

The classic assumption tests used in this study as the following**:**

1. Noramility Test

According to Ghozali (2016) the purpose of the normality test is to find out whether the data in the regression equation are normally distributed or not normally distributed.

2**.** Multicollinearity Test

The purpose of multicollinearity test is to find out whether in the regression model, it can be found the correlation between independent variables (independent), a good regression model should not happen correlation between independent variables, if the independent variables correlate with each other, then these variables are not orgonal. Orgonal variable is an independent variable that its correlation value to other independent variables is equal to zero (Ghozali 2016).

3. Heteroscedasticity Test

Heteroscedasticity test is to test whether in the regression model there is an unequal variance from the residuals of one observation to another. If the variance from one observation residual to another observation still remains, then it is

called homoscedasticity and if different is called heteroscedasticity (Ghozali 2016).

4. Autokoleration Test

Ghozali (2016) states that the autokoleration test is a test to find out whether in the linear regression model there is a correlation between the disturbance error in period t and the error error period t-1 (before).

F Test

F Test is used to determine the effect of all independent variables together on the variation of independent variables (the number of requests for yellowfin tuna) with a 95% confidence level. The calculated F formula is as follows:

$$\text{F Counting} = \frac{R^2/(k-1)}{(1-R^2)/(N-k)}$$

Information :

R^2 : Determination Coefficient

N : Number of Observations

K : Number of Variable

T Test

T test is used to determine the effect of each independent variable on the variation of the dependent variable, it is the number of demand for yellowfin tuna at a certain significant level (α), it is α = 5%. T arithmetic formula is as follows:

$$\text{T Counting} = \frac{\beta i}{Se(\beta i)}$$

Information :

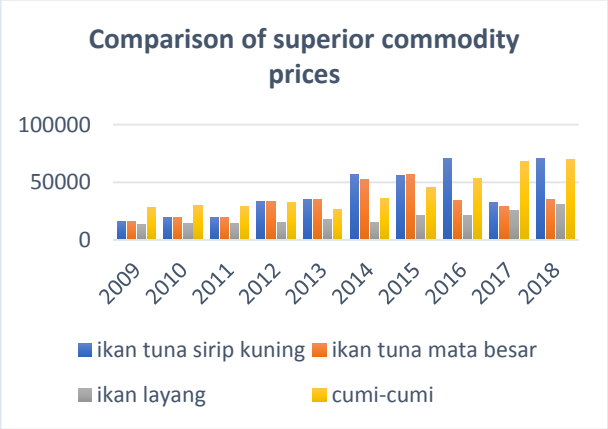
T Counting : Statistic T Value

β_i : The Regression Coefficient of the I Independent Variable

Se (β_i) : The Standard Error Independent Variable Regression Coefficient

RESULT AND DISCUSSION

The data on the comparative price of superior fish The Nizam Zachman Ocean Fishery Port is the price collected from the value of the production of superior commodities that is divided by demand for superior commodities in the modern fish market is the result of superior commodity prices per kilogram. The below graph is a comparison of the price of fish per kilogram which includes the price of yellow fin tuna, the price of bigeye tuna, Flyfish, squid in the Modern Fish Market from 2009-2018 in the Picture 1:

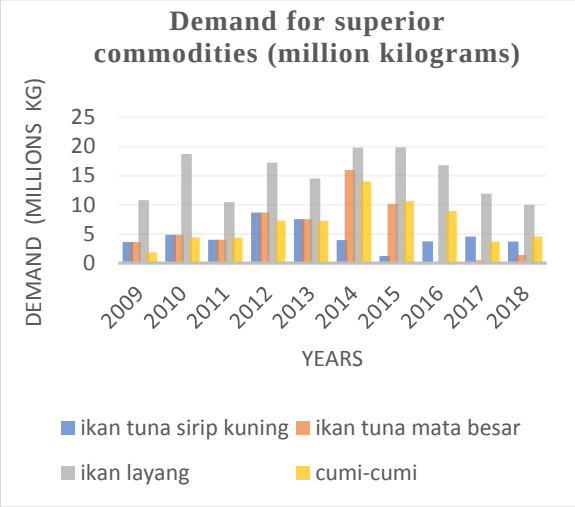


Picture 1. Comparison of superior commodity prices in the Fish Modern Market 20019-2018

Based on the graph in Picture 1, it can be found out that the comparative price of superior commodities in the modern fish market in the period 2009-2018. In the year of 2009-2011, the commodity fish with the highest price was squid. Furthermore, in 2012, the highest pric fish commodities were yellowfin tuna, bigeye tuna and squid. In 2013, there were two commodities with the highest price, they are yellowfin tuna and bigeye tuna. In 2014-2018 yellowfin tuna is the highest price compared to other superior commodities. Based on graphic data for the period 2009-2018, the lowest fish price among the leading commodities in the modern fish market is the Flyfish. Can be known based on the graph 2009-2018 yellowfin tuna is a fish commodity that is quite high in value compared to other commodities.

In this study, researchers took Modern Fish Market data as a fish sale distribution in the Demand Yellowfin Tuna Elasticity research. The data was the demand and value of leading commodity production from 2009 - 2018 through the fish demand data where the data was collected from the The Nizam Zachman Ocean Fishery Port, using the annual statistical report of the Nizam Zachman Ocean Fisheries Port. The comparison graph of demand for leading commodities in the Modern Fish

Market, The Nizam Zachman Ocean Fishery Port, in the Picture 2:



Picture 2. Comparison Chart of Demand for Commodities in Modern Fish Market

Based on graph in Picture 2, it can be found out that the comparison of demand for superior commodities in the Modern Fish Market are seen that almost all superior commodities have increased and decreased in the fluctuating amount of production. The increase and decrease that occurs in the quantity of demand, especially in yellowfin tuna is influenced by several factors. According to Fauzi (2015) an increase and decrease in fish demand is caused by the season so that there is an imbalance of the catch when the fishing season (harvest) occurs over supply, while the famine season (west and east) or when there is a full moon, so the fish catching production becomes decreasing, and then the decreasing in demand for landed fish is because the fish have first been bought by traders in the middle of the sea and landed in other regions by fishermen

Demand Elasticity

The results of the analysis of the elasticity of the price of yellowfin tuna in the modern fish market of the Nizam Zachman Ocean Fisheries Port in Table 1:

Table 1. Elasticity Value of Yellowfin Tuna Demand at the Nizam Zachman Ocean Fishing Port

	ElasticityValue		
Variable	Price	Cross	Income
The Price of Yellowfin Tuna	- 0,0062		
The Price of Flyfish		0,015	
The Price of Bigeye Tuna		0,018	
The Price of Squid		0,014	
The Price of Rice		0,021	
Income Per Capita			0,027

Based on the following table 1 data below, it can be explained that the elasticity of demand is based on price elasticity, cross elasticity and income elasticity:

1. Price Elasticity

Based on table 18 above, it can be found out that the coefficient of the elasticity value of yellowfin tuna is 0.0062 and it is inelastic because Eh> 1. This happens when the percentage demand change is smaller than the percentage price change. The negative elasticity value indicates that the variable price of yellowfin tuna has an inverse relationship with the demand for yellowfin tuna. Means that if there is an increase in the price of yellowfin tuna by 1%, then the percentage decrease in demand for yellowfin tuna will decrease by 0.0062% and vice versa. Negative signs only explain the inverse relationship between the price of goods and the amount of demand (Sukirno, 2013)

2. Cross Elasticity

Based on the results of the analysis it is known that the cross elasticity value of yellow fin tuna to Flyfish is 0.015, meaning that if the Flyfish has increased by 1%, the demand for yellow fin tuna will increase by 0.015% and vice versa. The value of elasticity that is positive is also indicated that the Flyfish is a substitute item (substitute) of yellowfin tuna. This is caused by Flyfish classified as a superior commodity in the modern fish market.

The coefficient of cross elasticity of yellowfin tuna to changes in the price of bigeye tuna is 0.018, it means that if the price of bigeye tuna rises by 1% then the demand for yellowfin tuna will increase by 0.018%. Positive elasticity value indicates that bigeye tuna is a substitute item (yellow fin tuna). This is because bigeye tuna are classified as a superior commodity in the modern fish market.

The coefficient of cross elasticity of yellowfin tuna to squid is 0.014, it means that if the squid has a price increasing of 1%, the demand for yellowfin tuna will increase by 0.014% and vice versa. Positive elasticity value also indicates that squid is a substitute item (substitute) for yellowfin tuna. This is because squid are classified as a superior commodity in the modern fish market.

The coefficient of cross elasticity of yellow fin tuna to the price of rice is 0.021, it means that if the price of rice has increased by 1%, the demand for yellow fin tuna will increase by 0.021% and vice versa. The positive elasticity value also indicates that the price of rice is not a complementary item from yellowfin tuna.

3. Income Elasticity

Based on the results in table 18, it is known that the income elasticity of yellowfin tuna is 0.027, it means that if income rises by 1% it will increase demand for yellowfin tuna by 0.027% and vice versa. A value of Ep = 0 means that this elasticity is inelastic. That changes in revenue of DKI Jakarta can provide a smaller response to an increase in the amount of demand for organic rice (Salvatore 2009). Positive income elasticity values indicate that yellowfin tuna is a normal item, in this case the number of requested yellowfin tuna will increase if the income also rises. According to Sukirno (2013) an item is called normal if the item has demand increasing as a result of an increase in income.

The Causative Factors

Table 2. Variable Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	sig
		B	Std. Error	Beta		
1	(Constant)	4838923	757628,7		6,387	,008
	The Price of Yellowfin Tuna	45,730	9,136	,778	5,005	0,15
	The Price of Flyfish	104,495	24,224	,909	4,314	0,23
	The Price of Big Eye Tuna	98,750	38,800	1,033	2,545	0,84
	The Price of Squid	-34,981	13,986	-,818	-2,501	0,88
	The Price of Rice	743,495	194,523	2,496	3,822	0,32
	Income per Capita	-,009	,002	-3,165	-3,687	0,35

The multiple linear regression equations that is collected based on the results of the data analysis in Table 19 aras follows:

Y = 4838923 + 45.730X1 + 104.495X2 + 98.750X3 - 34.981X4 +743.495X5 - 0.009X6

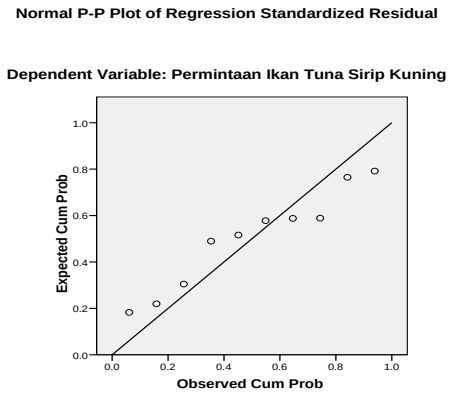
The regression coefficient shows the independent variable shows the direction of the relationship of the independent variable indicating the direction of the relationship of the variable concerned with the demand for yellowfin tuna. Regression coefficients for the independent variables X4 and X6 are negative, indicating an unrelated relationship between squid prices and per capita income with demand for yellowfin tuna. X4 variable regression coefficient of 34.981 implies that for each increase in the price of one unit of squid will cause a decrease in demand for yellowfin tuna by 34.981. The variable coefficient X6 of 0.009 means that for each increase in income per capita of the population of DKI Jakarta by one unit will cause a decrease in demand for yellowfin tuna by 0.009.

Regression coefficients for the independent variables X1, X2, X3 and X5 are positive, indicating a direct relationship between the price of yellow in tuna, the price of Flyfish, the price of bigeye tuna, and the price of rice. Regression coefficient on each variable of 45.730X1, 104.495X2, 98.750X3 and 743.495X5 means that for each increase in the price of yellowfin tuna, the price of Flyfish, the price of bigeye tuna, and the price of one unit of rice will cause an increase in demand yellowfin tuna fishes are 45.730X1, 104.495X2, 98.750X3 and 743.495X5 units.

1. Test Classic Assumptions

- Normality Test

The result of normality test is shown as Picture 3 as following:



Picture 3. Normal P-P plot

Source: Secondary data analysis results (2019)

Based on Picture 3 the normal probability plot graph above shows that the data spreads around the diagonal line and follows the direction of the dioagonal line, the regression model meets the normality assumption where the plot tends to be around the straight line.

- Multicollinearity Test

Table 2. Multicollinearity Testing

Variable	Collinearity Statistics		Information
	Tolerance	VIF	
The Price of Yellowfin Tuna	0,267	3,740	There is no Multicollinearity
The Price of Flyfish	0,146	6,873	There is no Multicollinearity
The Price of Bigeye Tuna	0,039	5,520	There is no Multicollinearity
The Price of Squid	0,060	6,572	There is no Multicollinearity
The Price of Rice	0,015	5,985	There is no Multicollinearity
Income per Capita	0,009	4,104	There is no Multicollinearity

Source: Secondary data analysis results (2019)

Table 2 shows that there are no variables that have a VIF value greater than 10 and a tolerance value that is smaller than 10%. This shows that between the independent variables, they are the price of yellowfin tuna, the price of Flyfish, the price of bigeye tuna, the price of squid, the price of rice and income per capita there is no multicollinearity in the regression model.

• Heteroscedasticity Test

Table 3. Heteroscedasticity Test

Variabel	Koef. Korelasi	P value	Keterangan
The Price of Yellowfin Tuna	0,055	0,881	There is no Heteroscedasticity
The Price of Flyfish	-0,309	0,385	There is no Heteroscedasticity
The Price of Bigeye Tuna	0,139	0,701	There is no Heteroscedasticity
The Price of Squid	0,079	0,829	There is no Heteroscedasticity
The Price of Rice	0,261	0,467	There is no Heteroscedasticity
Income per Capita	0,055	0,881	There is no Heteroscedasticity

Source: Secondary data analysis results (2019)

Based on table 3 above, it can be seen that the value of p value of yellowfin tuna is 0.881, the value of p value of Flyfish is 0.385, the value of p value of bigeye tuna is 0.701, the value of p value of squid price is 0.701, the value of p value of price rice 0.467, the value of p value of income per capita is 0.881 and the value of p value or the significance of these six variables> 0.05, thus it can be concluded that the regression model has no symptoms of heteroscedasticity.

- Autokolerasi Test

Table 4. Autocorrelation Test Results

Model Summary(b)

Model	R	R Square	Adjusted R Square	Durbin-Watson
	R Square Change	F Change	df1	Sig. F Change
1	,990(a)	,981	,942	2,087

Source: results of secondary data analysis (2019)

Based on table 4 above, it can be seen that the value of Durbin Watson is 2.087, the comparison uses the significance value. DL value on the number of independent variables 6 (K) and the number of samples 10 (T). Based on the Durbin Watson table is DL = 0.243 while the DU value is 2.822. Then DW = 2,087 so that dL <dw <dU, it can be concluded that the test is not conclusive or cannot be conclude

2. Test F

Test F is used to determine whether the independent variables studied together have a significant effect on variations in demand for yellowfin tuna. The results of the F test analysis in Table 5 are as follows:

Table 5. Results of Analysis of Variance Demand for Yellowfin Tuna

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Residual	4374701772130,479	6	729116962021,747	25,298	,012(a)
	Regression	86464443016,422	3	28821481005,474		
	Total	4461166215146,901	9			

.a.Predictors: (Constant, Per capita income, Squid Prices, Yellowfin Tuna Price, Flyfish Price, Bigeye Tuna Price, Rice Price

b Dependent Variable: Demand for Yellowfin Tuna

Source: Secondary data analysis results (2019)

Based on Table 5 above it is known that the significance value of 0.012 and smaller than α = 0.05, when using the F table the value of 3,374 is obtained. Thus, H0 is rejected and H1 is accepted, which means that the independent variables studied together have a significant effect on the demand for yellowfin tuna at the Nizam Zachman Ocean Fisheries Port at a 95% confidence level. Means that the variable price of yellowfin tuna prices, Bigeye Tuna Prices, Flyfish Prices, Squid Prices of Rice Prices and per capita income together have a significant effect on the demand for yellowfin tuna at the Nizam Zachman Ocean Fishing Port.

3. T Test

Table 6. T-Test Analysis Results of each independent variable

Variable	Regression Coefficient	Error Standart	T Counting	Significance	Conclusion
The Price of Yellowfin Tuna	45,730	9,136	5,005	,015	Significance
The Price of Flyfish	104,495	24,224	4,314	,023	Significance
The Price of Bigeye Tuna	98,750	38,800	2,545	,084	Not Significance
The Price of Squid	-34,981	13,986	-2,501	,088	Not Significance
The Price of Rice	743,495	194,523	3,822	,032	Significance
Income per Capita	-,009	,002	-3,687	,035	Significance

Source: Secondary data analysis results (2019)

Based on table 6 ,it can be seen that the variable price of yellowfin tuna, the price of flyfish, the price of rice and income per capita significantly influence the demand for yellow fin tuna to a 95% confidence level. This is indicated by the significant value of the price of yellow fin tuna, the price of flying fish, the price of rice and income per capita which is smaller than the value of $\alpha = 0.05$, when using the t-table, the value becomes 3.182 if seen in table 24 of the value of t- arithmetic greater than 3.182 is the variable price of yellowfin tuna, price of flying fish, price of rice and income per capita (t hit> t tab) meaning that these variables have a real influence on the dependent variable, they are demand for yellow fin tuna variable fish price, bigeye tuna, and squid prices do not significantly affect the demand for yellow fin tuna because it has a smaller t-count value than t-table.

CONCLUSION

Research on the elasticity of demand for yellowfin tuna in the modern fish market of The Nizam Zachman Ocean Fishery Port, Muara Baru, North Jakarta City has some conclusions:

1. The value of the elasticity of yellowfin tuna is -0.0062, which means the price of yellowfin tuna is inelastic. Whereas in cross elasticity, the variable used is the price of fly fish with an elasticity value of 0.015, while the price of big eye tuna has an elasticity value of 0.018 squid prices have an elasticity value of 0.014, the price of rice has an elasticity value of 0.021. In the price of flying fish, the price of big-eye tuna, the price of the squid and the price of rice are elasticity values less than 1. These four variables are substitutes for yellowfin tuna. The value of income elasticity is 0.027, which is inelastic.
2. Factors influencing the demand for yellow fin tuna at the Nizam Zachman Ocean Fisheries Port, they are the price of yellow fin tuna, the price of flying fish, the price of big eye tuna, the price of squid, the price of rice and the income per capita.

REFERENCE

Budi, Purnomo S. 2009. *Obligasi Daerah*. Alfabeta: Bandung.

Fauzi, A dan S Anna. 2015. *Ekonomi Perikanan Teori, Kebijakan, dan Pengelolaan*. Gramedia Pustaka Umum. Jakarta

Ghozali, Imam. 2016. *Aplikasi Analisis Multivariete Dengan Program IBM SPSS 23 (Edisi 8)*. Cetakan ke VIII. Semarang : Badan Penerbit Universitas Diponegoro.

Lubis E. 2011. Kajian peran strategis pelabuhan perikanan laut terhadap pengembangan perikanan laut. *Akuatik Jurnal Sumberdaya Perairan*. Fakultas Pertanian, Perikanan dan Biologi Universitas Bangka Belitung. 5(2):1-7.

Pelabuhan Perikanan Nizam Zachman. 2016. Laporan Tahunan Pelabuhan 2016. Jakarta (ID): PPS Nizam Zachman.

Salvatore, D. dan Krugman. 2009. *Ekonomi Internasional*. PT Gelora Aksara Pratama. Bandung.

Sam A. 2012. Pengembangan Pelabuhan Perikanan Samudera Nizam Zachman Jakarta sebagai Pusat Pemasaran dan Pelabuhan Ekspor-Impor Hasil Perikanan [*Desertasi*]. Bogor (ID): Institut Pertanian Bogor.

Sukirno, Sadono. 2013. *Pengantar Teori Makroekonomi.* PT. Raja Grafindo Persada: Jakarta.

Sukirno, S. 2016. *Teori Mikro Ekonomi*. Cetakan Keempat Belas. Rajawali Press. Jakarta.