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# ELASTICITY OF DEMAND MARINE FISH CONSUMPTION IN CARINGIN CENTRAL MARKET BANDUNG

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KeyWords
Caringin central Market Bandung, Elasticity of Demand, Marine fish consumption.



ABSTRACT

This study aims to analyze the factors that influence the demand for marine fish consumption and determine the value of elasticity of demand for marine fish consumption in Caringin Central Market, Bandung. This research was held in February until April 2019. The method used was descriptive analytical method using primary data and secondary data. The sampling technique used in this study was purposive sampling. Purposive sampling technique is a sampling technique that is carried out by taking samples from the population based on certain criteria. The results of the study shows that the factors that influence the demand for marine fish consumption are the prices of sea fish (prices of skipjack tuna, prices of round scad fish, prices of milkfish), prices of rice, and income. The value of price elasticity and cross elasticity in demand for consumption sea fish are inelastic. The income elasticity on demand for skipjack tuna and milkfish is elastic while the income elasticity on demand for round scad fish is perfectly inelastic.

## INTRODUCTION

Fish are all types of organisms that part or all of their life cycles are in the aquatic environment (Law No. 45 of 2009). Fish are highly perishable commodities. The quality of marine fish needs to be safeguarded from when fish are caught, handling processes on board, in ports, distribution and marketing until consumed by consumers. Important management of fish quality is understood by all fisheries stakeholders, starting from stakeholders engaged in fishing, distribution and marketing activities. Fish suppliers play an important role, so that the fish supplied to consumers are still in good quality. One problem that is often faced is consumer demand for fish products that often fluctuate (Nurani *et al.* 2011).

The city of Bandung is the capital of West Java Province which is strategically located, so that the city of Bandung is a fairly densely populated city today. According to the Central Bureau of Statistics, Bandung City is an area with the highest population density in West Java. The city of Bandung has a fairly rapid economic development in the field of business, culinary business is one of them. The raw materials used in the culinary business include fish that are immediately processed and then eaten and there are also fish that are processed by being transformed into other products so that they are more attractive and attractive to consumers (Kusumawardani *et al.* 2012). According to the head of the food security department at the Bandung Food and Agriculture Office, the fish market or the largest provider of marine fish in Bandung Raya is located in the Caringin Central Market, Bandung City.

Based on Information Statistics Data of the Ministry of Fisheries, in 2010-2014 West Java was a province with an average fishery production of between 490 thousand and 1 million tons per day. Based on data from the Bandung Food and Agriculture Service, the average fish consumption per capita rate always increases every year, in 2014 the consumption rate reached 33.95 kg / cap and in 2015 it increased to 34.20 kg / cap in 2016, increasing again. to 34.98 kg / cap and in 2017 it continues to increase to 36.94 kg / cap. According to the Department of Marine and Fisheries (2003) the Indonesian people have not fully consumed fish, even though Indonesia is a country that has a large potential of fisheries (especially the sea) with a total resource potential of 63,760,100 tons.

According to Virgantari *et al.* (2011) research on the demand for fish products is generally combined with studies on demand for animal food, whereas information on patterns of fish consumption and how people's responses to changes in prices and income are needed to predict welfare, the effects of technological change, and infrastructure development or other economic policies. This study also serves to identify the effect of price changes on the behavior patterns of consumers of consumption fish in the city of Bandung, so that the state of the market in accordance with the price and ability of consumers to buy fish products. So from that this research was made with the aim of knowing the elasticity of demand for consumption of marine fish in the Caringin Central Market, Bandung.

## MATERIAL AND METHODS

This research was carried out at the Caringin Central Market, Bandung in February to April 2019. The method used in this study was descriptive analytical method. The sampling technique used in this study was purposive sampling technique which means the sampling technique is done by taking samples from the population based on certain criteria (Hartono 2014). The type of data used in this study are primary data and secondary data. Primary data was obtained from interviews with the Market Management Agency, while secondary data was obtained from traders and consumers of consumable sea fish in the Caringin Central Market, Bandung City. Data analysis in this study is using statistical model testing and elasticity testing. Testing statistical models through the *SPSS 23* application by using multiple linear regression methods which include correlation tests, test coefficient of determination, F test, and t test. Testing the elasticity model includes the elasticity of price demand, the elasticity of cross demand, and the elasticity of income demand. The following are the formula for testing elasticity of demand.

1. Price Elasticity

$$\text{Ep} = \frac{\%\Delta Qx}{\%\Delta Px} \longrightarrow \text{Ep} = \frac{\Delta Qx}{\Delta Px}\frac{P}{Qx}$$

Information :
Ep : Price elasticity of demand
Px : Item X price
Qx : Number of demand for item X
ΔQx : Change in the number of X demand
ΔPx : Change in the price of X item

2. Cross Elasticity

$$\text{Ec} = \frac{\%\Delta Qx}{\%\Delta Py} \longrightarrow \text{Ec} = \frac{\Delta Qx}{\Delta Py}\frac{Py}{Qx}$$

Information :
Ec : Elasticity cross

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Py : Item Y price
Qx : Number of demand for item x
ΔQx : Change in the number of X demand
ΔPy : Change in the price of Y item

3. Income Elasticity

$$\text{Ei} = \frac{\%\Delta Qx}{\%\Delta I} \longrightarrow \text{Ei} = \frac{\Delta Qx}{\Delta I}\frac{I}{Qx}$$

Information :
Ei : Elasticity income
I : Consumer income
Qx : Number of demand for item x
ΔQx : Change in the number of X demand
ΔI : Changes in consumer income

## RESULTS AND DISCUSSION

### Overview of Research Sites

The Central Caringin Market is located on Jalan Soekarno Hatta No. 220 kec. Babakan Ciparay, Bandung City, West Java. Induk Caringin Market is one of the largest traditional markets in the city of Bandung. The Caringin Central Market is a private-owned market (non-government) which was established in 1987 until it was finally completed and began operations in 1990. This market has a land area of 15 hectares which consists of shop houses and booths or stalls each measuring 2x3 meters.

Marine fish consumption in the Caringin Central Market were obtained from the Ocean Fishery Port of Nizam Zachman, Jakarta. The biggest consumption of marine fish traders in the Caringin Central Market is Jasa Bahari. Jasa Bahari in the Caringin Central Market are distributors of consumer marine fish consumption in Bandung also West Java. Every day a stock of marine fish is consumed by traveling to a port in Jakarta using a truck. The stock of fish that is brought relatively has the same amount every day, which is about 5 quintals to 2 tons each type of fish. Marine fish consumption that have been transported from Jakarta to Bandung are then stored in a refrigeration room with a temperature of -11 ° C.

Caringin Central Market selling marine fish consumption include among them Skipjack Tuna, Baby Tuna, Albakor, Lisong (cob), Salem (mackerel), Round Scad (deles), Lemuru (sardine), Milkfish, Siro, and others. Research on the Caringin Central Market was carried out by using three samples of marine fish consumption, namely skipjack tuna, round scad fish, and milkfish because the three fish species had the highest production and demand among other marine fish consumption.

### Demand for Marine Fish Consumption

Demand for marine fish consumption in the Caringin Central Market in Bandung was obtained from interviews with traders and consumers. This demand data is obtained by approaching the number of fish / kg consumed by consumers either directly or indirectly or in other words the intended demand is the amount of consumption of fish consumed by consumers in a certain period of time. The time period used is every day for 2 months during the study period. The results of the demand data obtained are obtained from approximately 60 consumers. The following is the data on demand for skipjack tuna, round scad fish and milk fish which begin in the 3rd week of February to April of the 2nd week in Table 1.

**Table 1 :** Demand for Marine Fish Consumption in Caringin Central Market

| Periode | Demands (kg) | | |
|---|---|---|---|
| | Skipjack Tuna | Round Scad Fish | Milkfish |
| Weeks III February | 6.610 | 2.648 | 4.358 |
| Weeks IV February | 6.600 | 2.753 | 4.605 |
| Weeks I March | 6.740 | 2.729 | 4.808 |
| Weeks II March | 6.900 | 2.684 | 4.400 |
| Weeks III March | 6.735 | 2.742 | 4.628 |
| Weeks IV March | 6.686 | 2.719 | 4.583 |
| Weeks I April | 6.680 | 2.678 | 4.728 |
| Weeks II April | 6.750 | 2.694 | 4.494 |
| Averages | 6.713 | 2.706 | 4.576 |

Skipjack tuna is the most popular fish in the Caringin Central Market. Based on the above data it can be seen that the average demand for sea fish is the largest consumption of skipjack tuna, which is equal to 6,713 kg. This is because the people of Bandung

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even in West Java, prefer skipjack tuna to other sea fish. However, round scad fish and milkfish are also one of the favorite or alternative favorites of fish whose consumption rate (demand) is higher than other marine fish such as mackerel, tuna, and lemuru fish. It can be seen in Table 1 that the average demand for round scad every week is 2,706 kg while milkfish is 4,576 kg.

The demand for consumption of marine fish in the Caringin Central Market over a period of 2 months tends to be stable. This is because the majority of consumers in the Caringin Central Market have a profession as traders who get their daily raw materials from this market. According to the Food and Agriculture Office of the City of Bandung, the Caringin Central Market is the largest supplier or provider of consumption sea fish in West Java so that most consumers found in this market are permanent consumers, traders, such as vegetable sellers, groceries, wholesalers and retailers. even other market traders in the city of Bandung. The data for consumption sea fish demand in graphical form in Figure 1 as follows.

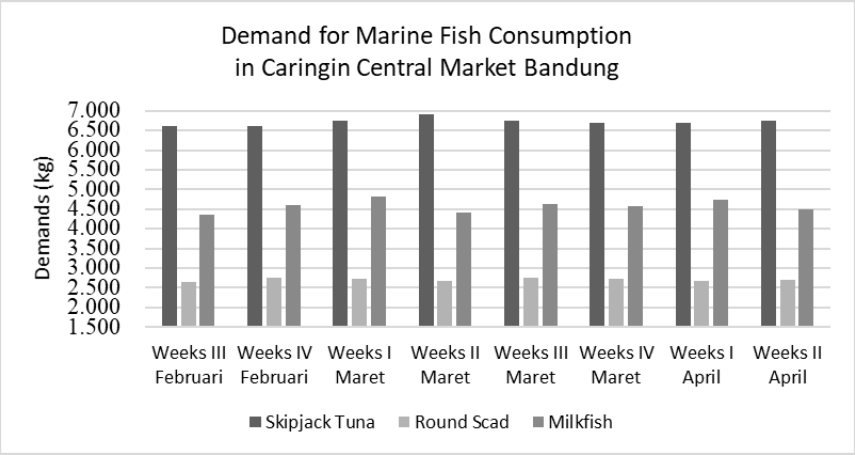


Fig 1 : Demand for Marine Fish Consumption in Caringin Central Market

The graph above shows a comparison of the number of demand for consumption sea fish species, namely skipjack, round scad fish, and milkfish. Based on Figure 1 it can be seen that the comparison of demand between different types of fish has a significant difference. However, if viewed based on the same type of fish in each week, the three fish have a demand with a difference that is not so large, or in other words the demand for each type of fish that is the same every week is classified as stable. Data on fish demand every week is always different, this is due to differences in the frequency of spending (time of purchase) of each consumer. In addition, differences in the need for fish for each consumer also vary, so that it can affect the accumulation of demand data.

## Prices of Marine Fish Consumption

Skipjack Tuna

Based on the results of the study obtained data in the form of the price of per-kilogram skipjack tuna in the Caringin Central Market, Bandung. This data is obtained through an interview process with consumption of sea fish traders. The results obtained in the form of an average price of skipjack tuna every week. This data includes the development of the price of skipjack tuna when the research period begins until completion, namely from February in the 3rd week to April in the 2nd week of 2019. The following is a chart of the price of skipjack tuna presented in Figure 2.

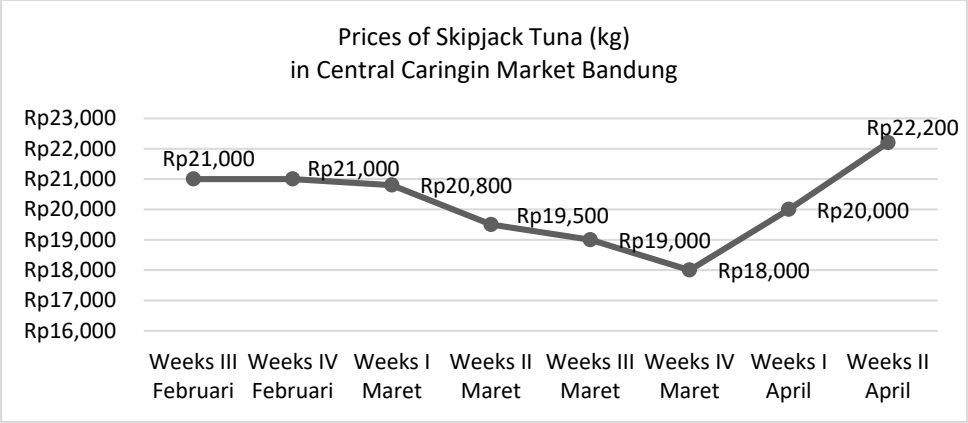


Fig 2 : Skipjack Tuna Prices Chart (kg)

The price of skipjack tuna in this study is the amount of money spent by consumers to get one kilogram of skipjack tuna. Based on Figure 2 it can be seen that the average price of skipjack tuna is very fluctuating. According to traders, the price of these fish can even change every day following the selling price in the Port. The highest price of skipjack tuna is in the 2nd week of April, which is Rp. 22,200 and the lowest price is in the 4th week in March, which is Rp. 18,000.

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Round Scad

Data in the form of the price of per-kilogram round scad in the Caringin Central Market Bandung were obtained through an interview process for consumption of sea fish traders. The results obtained are in the form of the average price of round scad fish in each week. This data includes the development of round scad fish prices in February on the 3rd Sunday to April on the 2nd Sunday of 2019. The following is a graph of the development of round scad prices presented in Figure 3.

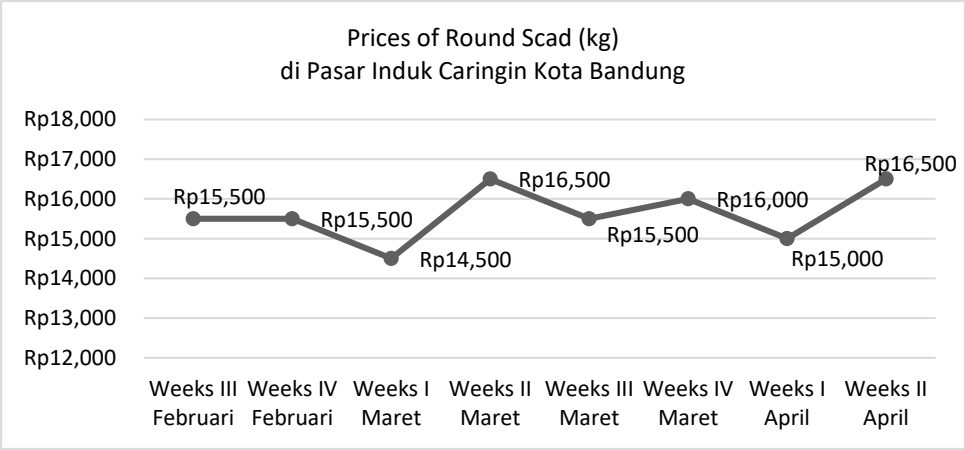


Fig 3 : Round Scad Price Chart (kg)

The price of round scad in this study is the amount of money spent by consumers to get one kilogram of round scad. Based on Figure 3, it can be seen that the average price of round scad has fluctuated. According to traders, the price of this round scad can change every day following the selling price in the Port, however the price changes that occur will not be far from the average price. The highest average price of round scad is Rp. 16,500 in the second week of March and the second week of April while the lowest price is in the first week of March which is Rp. 14,500.

Milkfish

The data in the form of price of per-kilogram milkfish in the Caringin Central Market Bandung was obtained through an interview process for consumption sea fish traders. The results obtained are in the form of the average price of round scad in each week. This data covers the development of milkfish prices starting in February on the 3rd Sunday until April on the 2nd Sunday of 2019. The following is a graph of the development of milkfish prices presented in Figure 4.

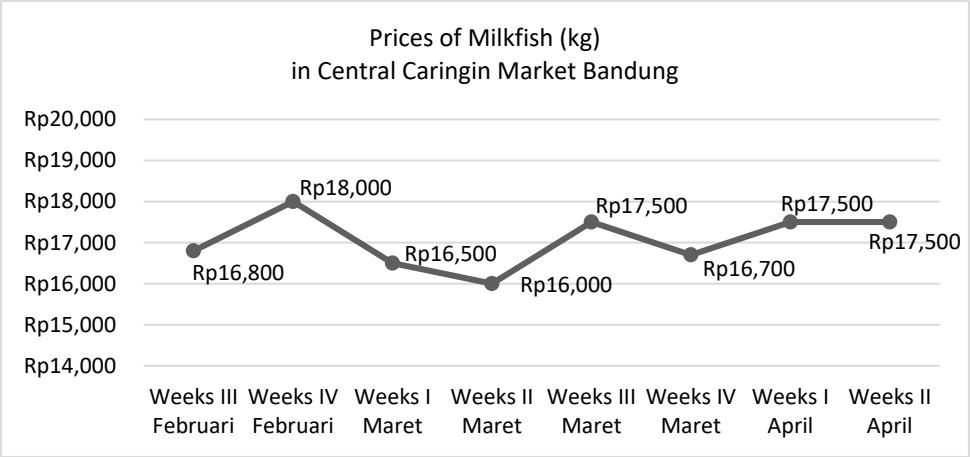


Fig 4 : Milkfish Price Chart (kg)

The price of milkfish in this study is the amount of money spent by consumers to get one kilogram of milkfish. The same is true for skipjack tuna and round scad fish. The average price of milkfish changes every week. Fluctuations in changes in the price of milkfish have a difference that is not too far compared to skipjack tuna. According to traders, the price of milkfish can even change every day following the selling price in the Port. The highest average price of milkfish is in the 4th week of February which is Rp.18,000 while the lowest price is in the second week of March which is Rp. 16,000.

Causes of Changes in Marine Fish Consumption Prices

Based on the research results, the consumption of marine fish consumption in the Caringin central Market can change every day so that this is considered reasonable by consumers. According to traders, traders set prices according to the selling price at the port (PPS Nizam Zachman) so that if prices at the port rise, traders are forced to follow the price changes so that losses do not occur. Consumers already consider this to be reasonable, because the price range that changes remains at an average rate or in other words the

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price of marine fish consumption in the Caringin central Market is considered not to be soaring changes. Even when the purchase price at the port is said to be cheap or down, the marine fish consumption traders at the Caringin central Market also lowers the price.

For some consumers who work as fish processor will of course also be affected by this. There are several possibilities that occur if the price is considered too high, one of which is consumers will reduce the number of fish purchases or consumers will continue to buy fish with the same amount to meet the needs of raw materials with a note that usually the product sold will also experience an increase in price or get fewer benefits than usual.

Based on the results of research the selling price at this port can change due to the condition or the amount of fish stocks contained in cold storage. As is well known that PPS Nizam Zachman is the largest port in Indonesia, so that the percentage of fish stocks in the port is allocated for export rather than local. Especially since the holding of a moratorium on fishing activities by foreign vessels and restrictions on vessels under 150 GT, it is suspected to cause increased export volumes and reduce local stock. The Minister of Marine and Fisheries of Indonesia once explained that the increased volume of fish exports could be beneficial because it could increase the country's foreign exchange, but he also stated that local fish stocks must still be met.

According to Kusmiati (2007) the abundant catch of fishermen causes prices to tend to go down, on the contrary if the catch of fishermen is small, the price of fish goes up. This does not apply to the Caringin central Market which supplies fish from PPS Nizam Zachman, because at the stock port there will always be plenty in cold storage. Vessels that have been anchored are large vessels that capture at sea for 2-6 months, besides that almost every day there is loading and unloading at the port so that marine fish stocks will always be there. According to interviews with marine fish traders, the consumption percentage of fish stocks destined for local needs is decreasing because the port prioritizes stocks for export, therefore selling prices for locales must be increased to continue to meet the needs of local consumers.

Rice Prices

Data on rice prices in the city of Bandung is the primary data obtained from the Food Price Information Portal (PRIANGAN). This site is also managed by several parties, namely West Java Bulog, West Java Agriculture Service, West Java Marine and Fisheries Service, West Java Office of Industry and Trade, Animal Husbandry Service and others. The data taken is the weekly rice price data which starts in February 3rd week until April 2nd week of 2019. Graph of rice price development can be seen in Figure 5.

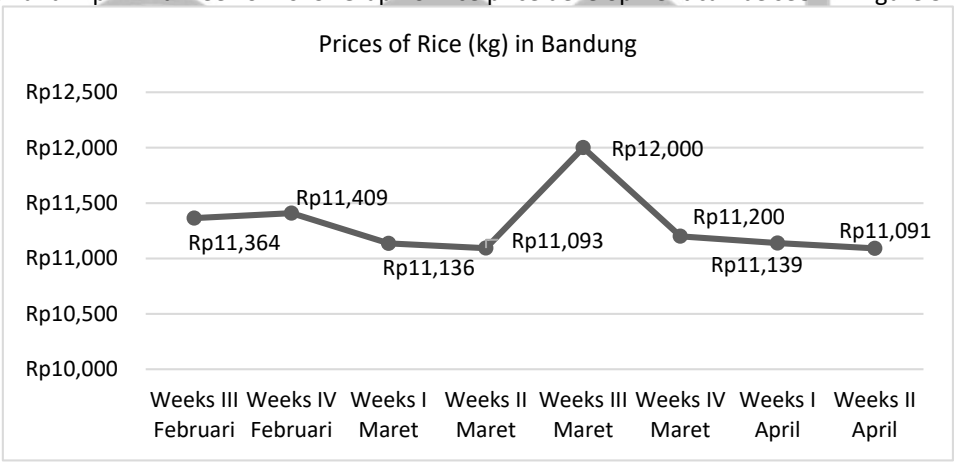


Fig 5 : Rice Price Chart (kg)

The price of rice in this study is the amount of money spent by consumers to get one kilogram of rice. This price is the average price of medium rice circulating in the city of Bandung. Rice in this study is complementary goods or complementary goods in consuming sea fish. According to the head of the food security department at the Food and Agriculture Office of the City of Bandung, rice prices are currently quite stable, meaning there is no significant increase or decrease. Based on Figure 5, the highest rice prices occur in March 3rd week, which is Rp. 12,000 / kg while the lowest price is in the 2nd week of April which is Rp. 11,091 / kg.

## Data Analysis

Test of Statistical Criteria

Data analysis of statistical model testing was conducted to obtain results from the factors that influence the demand for consumption of marine fish. Regression calculation is done by using *SPSS 23 Software* with statistical criteria which include correlation test, test coefficient of determination, f test, and t test. Statistical tests for multiple linear regression demand for consumption of marine fish are divided into three based on the type of fish, namely statistical tests of skipjack tuna, test of round scad statistics, and statistical tests of milkfish.

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**Statistics Model of Skipjack Tuna**

The following are the results of the correlation test and test the coefficient of determination of the demand for skipjack tunaas presented in Table 2.

Tabel 2 : Correlation Test Results and Coefficient of Determination Test for Skipjack Tuna

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,892[a] | 0,796 | 0,772 | 14,125 |

a. Correlation Test

Correlation test is used to determine the degree of relationship and contribution of independent variables to the dependent variable. The result of the correlation test on the demand for skipjack tuna is the value of r = 0.892 the value of r approaches 1 or is in the interval 0.8-1, which means the demand for skipjack tuna (dependent variable) has a very strong relationship with the independent variable namely price of skipjack tuna, price of round scad, milkfish prices, rice prices, and income. The value of r is also positive which means that the relationship between variables is in the same direction or is directly proportional.

b. Determination Coefficient Test

Determination Coefficient Test is used to measure how far the ability of the independent variable in explaining the variation of the dependent variable (Ghozali 2009). Based on Table 2 it is known that the coefficient of determination shown by R square is equal to 0.796 which means the contribution of the independent variable (the price of skipjack tuna, the price of round scad, the price of milk fish, the price of rice, and income) is 79.6% in explaining the dependent variable namely tuna demand while the remaining 20.4% is explained by other variables not included in the calculation.

c. F Test

The F test was used to determine the effect of all independent variables (prices of skipjack fish, round scad prices, milkfish prices, rice prices, and income) jointly on the variation of the dependent variable (demand for skipjack). The results of the F test analysis of demand for skipjack tuna can be seen in Table 3 as follows.

Table 3 : Results of Analysis of Demand Skipjack Tuna Variance Requests

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 34154,683 | 5 | 6830,937 | 34,239 | ,000[b] |
| | Residual | 8778,297 | 44 | 199,507 | | |
| | Total | 42932,980 | 49 | | | |

Based on Table 3, it can be seen that the significance value is 0,000 this value is smaller than α = 0.05, which means that each independent variable is the price of skipjack, round scad prices, milkfish prices, rice prices, and income jointly have a significant effect at the level of 95% confidence in the demand for skipjack tuna. It is known that the F table value is 2.43 and the calculated F value on the demand for skipjack tuna is 34.239, which means that the calculated F value is greater than F table (Fhit> Ftab) which means, the independent variable (price of skipjack tuna, round scad prices, milkfish prices) , rice prices, income) together influence the change in the value of the dependent variable (demand for skipjack tuna).

d. t Test

The t test is used to determine the individual influence of each independent variable (price of skipjack, round scad prices, milkfish prices, rice prices, income) on the dependent variable, namely demand for skipjack tuna. The results of the t test analysis can be seen in Table 4 below.

Table 4 : Results of t Test Analysis for each Independent Variable

| Variable | Coefficient Refression | t-hit | Significance |
|---|---|---|---|
| Prices of Skipjack Fish | 0,005 | 2,973 | 0,005* |
| Prices of Round Scad | 0,006 | 1,573 | 0,123[ns] |
| Prices of Milkfish | 0,021 | 4,220 | 0,000* |
| Prices of Rices | -0,002 | -0,186 | 0,853[ns] |
| Income | 9,753 | 3,234 | 0,002* |

Information : * : significance at 95% confidence level
ns : not significant

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Based on Table 4, it can be seen that the significance value of the skipjack tuna price variable, milkfish price, and income has a value smaller than α = 0.05, which means that the variable has a significant effect on the demand for skipjack tuna at a 95% confidence level while for two other variables have a significance value greater than α so that the variable price of round scad and rice prices do not have a significant effect on demand for skipjack tuna.

The t-table value obtained is 2.015 if seen in Table 4, the t-count value greater than 2.015 is the variable price of skipjack, milkfish prices, and income (t hit> t tab) means that the three variables have a significant effect on dependent variable. Variables of round scad prices and rice price variables have a t-count value that is smaller than t-table means that the variable does not significantly influence the dependent variable (demand for skipjack).

Table 5 below will show variable coefficient values in multiple linear regression equations demand for skipjack tuna.

Table 5 : Coefficient Variable of Skipjack Tuna

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | -478,938 | 111,687 | | -4,288 | 0,000 |
| Prices of Skipjack Tuna | 0,005 | 0,002 | 0,286 | 2,973 | 0,005 |
| Prices of Round Scad | 0,006 | 0,004 | 0,156 | 1,573 | 0,123 |
| Prices of Milkfish | 0,021 | 0,005 | 0,483 | 4,220 | 0,000 |
| Prices of Rice | -0,002 | 0,008 | -0,014 | -0,19 | 0,853 |
| Income | 9,753 | 0,000 | 0,229 | 3,234 | 0,002 |

The multiple linear regression equations obtained based on the results of data analysis in Table 5 are as follows:

$$Y = - 478,938 + 0,005X_1 + 0,006X_2 + 0,021X_3 – 0,002X_4 + 9,753X_5$$

The regression coefficient value in the independent variables illustrates if the independent variable increases by one unit and the value of the other independent variables is constant or equal to zero, the value of the dependent variable is estimated to rise or fall according to the sign of the regression variable of the independent variable. The independent variable regression coefficient sign shows the direction of the relationship of the variable concerned with the dependent variable, namely demand for skipjack tuna.

The regression coefficient for the independent variable X1 is positive, which means that there is a unidirectional relationship between the price of skipjack tuna and the demand for skipjack tuna. The regression coefficient of X1 variable of 0.005 shows that each price increase of one unit skipjack tuna will cause an increase in demand for skipjack tuna by 0.005 units. Likewise, the X2 X3 and X5 variables have positive values so that the relationship between round scad prices, milkfish prices, and income to demand skipjack tuna is in the same direction. The variable coefficients X2 X3 and X5 are 0.006; 0.021; 9,753 shows that each increase in number per unit will cause demand for skipjack tuna to increase by 0.006; 0.021; 9,753 units. The regression variable X4 has a negative value, this shows that the relationship between the price of rice and the demand for skipjack tuna is not in the same direction.

**Statistics Model of Round Scad**

Correlation test results and test coefficient of determination of demand for round scad can be seen in Table 6 below.

Table 6 : Correlation Test Results and Coefficient of Determination Test for Round Scad

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,904[a] | 0,818 | 0,797 | 13,656 |

a. Correlation Test

The results of the correlation test analysis on round scad are the value of r = 0.904, the value of r approaches 1 or at intervals of 0.8-1, which means that the demand for round scad (dependent variable) has a very strong relationship with the independent variable namely round scad prices, prices of skipjack tuna, milkfish prices, rice prices, and income. The value of r is positive means that the relationship between variables is in the same direction or directly proportional.

b. Determination Coefficient Test

The value of R square (coefficient of determination) on the demand for flying fish (Table 6) is 0.818, which means that the independent variable is the price of round scad, the price of skipjack tuna, the price of milk fish, the price of rice, and income contributes 81.8% in explaining changes in demand of round scad (dependent variable) and the remaining 18.2% explained by other variables not included in the calculation.

c. F Test

The results of the F test analysis of the demand for round scad can be seen in Table 7 as follows.

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Table 7 : Results of Analysis of Round Scad Demand Variance

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 36796,429 | 5 | 7359,286 | 39,462 | ,000[b] |
| | Residual | 8205,571 | 44 | 186,49 | | |
| | Total | 45002,000 | 49 | | | |

Based on Table 7, it can be seen that the significance value is 0,000 this value is smaller than α = 0.05, which means that each independent variable is the price of round scad, the price of skipjack tuna, milkfish prices, rice prices, and income are jointly influential real on the 95% level of confidence in the demand for round scad. It is known that the F table value is 2.43 and the calculated F value on the demand for skipjack tuna is 39.326 which means that the calculated F value is greater than F table (Fhit> Ftab) meaning, independent variable (round scad prices, skipjack tuna prices, milkfish prices) , the price of rice, income) together influence the change in the value of the dependent variable (demand for round scad).

d. t Test

Table 8 shows the result of the t-test analysis on the dependent variable, namely the demand for round scad on each independent variable (round scad prices, skipjack tuna prices, milkfish prices, rice prices, income).

Table 8 : Results of t Test Analysis for each Independent Variable

| Variable | Coefficients Regression | t-hit | Signification |
|---|---|---|---|
| Prices of Round Scad | 0,011 | 3,450 | 0,001* |
| Prices of Skipjack Tuna | 0,003 | 2,068 | 0,045* |
| Prices of Milkfish | 0,010 | 2,214 | 0,032* |
| Prices of Rice | 0,006 | 0,770 | 0,445[ns] |
| Income | 1,702 | 5,100 | 0,000* |

Information : * : significance at 95% confidence level
ns : not significant

Based on the above data it can be seen that the variable prices of round scad, skipjack tuna prices, milkfish prices, and income have a significant (significant) effect on the 95% confidence level of the dependent variable, namely round scad demand, this is indicated by a smaller significance value than α = 0.05. The rice price variable has a significance value greater than α so that the rice price variable does not have a significant (significant) effect on the demand for round scad.

The t-table value obtained is 2.015 when seen in Table 8 the t-count value greater than 2.015 is the variable price of round scad, skipjack tuna prices, milkfish prices, and income (t hit> t tab) means the four variables has a real influence on the dependent variable. The variable price of rice does not significantly influence the demand for round scad because it has a smaller t-count value than t-table.

Table 9 below will show the variable coefficient values in the multiple linear regression equation for round scad demand.

Table 9 : Coefficient Variable of Round Scad

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | -423,539 | 97, 969 | | -4,323 | 0,000 |
| Prices of Round Scad | 0,011 | 0,003 | 0,266 | 3,450 | 0,001 |
| Prices of Skipjack Tuna | 0,003 | 0,002 | 0,164 | 2,068 | 0,045 |
| Prices of Milkfish | 0,010 | 0,004 | 0,221 | 2,214 | 0,032 |
| Prices of Rice | 0,006 | 0,007 | 0,051 | 0,770 | 0,445 |
| Income | 1,702 | 0,000 | 0,458 | 5,100 | 0,000 |

The multiple linear regression equations obtained based on the results of data analysis in Table 9 are as follows:

$$\mathbf{Y = - 423{,}539 + 0{,}011X_1 + 0{,}003X_2 + 0{,}010X_3 + 0{,}006X_4 + 1{,}702X_5}$$

The regression coefficient value in these variables illustrates if the independent variable increases by one unit and the value of other independent variables is constant or equal to zero, the value of the dependent variable is estimated to rise or fall according to the sign of the regression variable of the independent variable. The independent variable regression coefficient sign shows the direction of the relationship of the variable concerned with the dependent variable, namely the demand for fly fish.

The regression coefficient of each variable X1 - X5 has a positive value, meaning that there is a unidirectional relationship between the independent variables (round scad, skipjack tuna prices, milkfish prices, rice prices, and income) with the demand for

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round scad. The regression coefficient of X1 X2 X3 X4 X5 variable is 0.011; 0,003; 0.010; 0,006; 1,702 shows that every increase in round scad prices, skipjack tuna prices, milkfish prices, rice prices, and income of one unit will cause an increase in demand for skipjack tuna fish by 0.011; 0,003; 0.010; 0,006; 1,702 units.

**Statistics Model of Milkfish**

The following are the results of a correlation test and a test of the coefficient of determination of demand for milkfish as presented in Table 10.

Table 10 : Correlation Test Results and Determination Coefficient of Milkfish Coefficient Test

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,894[a] | 0,799 | 0,776 | 15,051 |

a. Correlation Test

The correlation test results on milkfish have a value of r = 0.894, the value of r approaches 1 or at intervals of 0.8-1 which means that the demand for milkfish (dependent variable) has a very strong relationship with the independent variable namely milkfish prices, round scad prices , prices of skipjack tuna fish, rice prices, and income. The value of r is also positive which means that the relationship between variables is in the same direction or is directly proportional.

b. Determination Coefficient Test

The value of R square (coefficient of determination) on demand for milk fish (Table 10) is 0.799, which means that the contribution of milkfish price variables, price of round scad, skipjack tuna, rice prices, and income in explaining the demand for milkfish is 79.9 % and the remaining 20.1% are explained by other variables not included in the calculation.

c. F Test

The results of the F test analysis of demand for milkfish can be seen in Table 11 as follows.

Table 11 : Results of Analysis of Milk Fish Request Variance

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 39573,385 | 5 | 7914,677 | 34,939 | ,000[b] |
| | Residual | 9967,115 | 44 | 226,525 | | |
| | Total | 49540,500 | 49 | | | |

Based on Table 11, it can be seen that the significance value of 0,000 this value is smaller than α = 0.05, so Ha is accepted and Ho is rejected, which means that each independent variable is milkfish prices, round scad prices, skipjack tuna prices, rice prices, and income jointly has a significant effect on the 95% confidence level in the demand for milkfish. It is known that the F table value is 2.43 and the calculated F value on the demand for skipjack fish is 34.939, which means that the calculated F value is greater than F table (Fhit> Ftab) meaning, independent variables (milkfish prices, round scad prices, skipjack tuna prices) , the price of rice, income) together influence the change in the value of the dependent variable (demand for milkfish).

d. t Test

The following are the results of the t-test analysis on the dependent variable, namely the demand for milkfish on each independent variable (milkfish prices, round scad prices, skipjack tuna prices, rice prices, income) presented in Table 12 below.

Table 12 : Results of t Test Analysis for each Independent Variable

| Variable | Coefficients Regression | t-hit | Significcation |
|---|---|---|---|
| Prices of Milkfish | 0,020 | 3,875 | 0,000* |
| Prices of Round Scad | 0,004 | 0,953 | 0,346[ns] |
| Prices of Skipjack Tuna | 0,006 | 3,340 | 0,002* |
| Prices of Rice | -0,003 | -0,330 | 0,743[ns] |
| Income | 1,253 | 3,384 | 0,002* |

Information : * : significance at 95% confidence level
ns : not significant

Based on Table 12 above, it can be seen that the variable price of milkfish, the price of skipjack tuna, and income have a significant effect on the 95% confidence level of the dependent variable, namely the demand for milkfish, this is indicated by a significance value smaller than α = 0.05 . Variable prices of round scad and rice prices have a significance value greater than α so that the variable prices of round scad and rice prices do not have a significant effect on the demand for milkfish.

The t-table value obtained is 2.015 when seen in Table 12 the t-count value greater than 2.015 is the variable price of milkfish, the price of skipjack tuna, and income (t hit> t tab) means that the variable has a significant effect on the dependent variable is the

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demand for milk fish. Variable prices of round scad and rice prices do not significantly affect the demand for milkfish because it has a t-count value that is smaller than t-table.

Table 13 below will show the value of variable coefficients in the multiple linear regression equation for milkfish demand.

Table 13 : Coefficient Variable of Milkfish

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | -435,557 | 107,287 | | -4,063 | 0,000 |
| Prices of Milkfish | 0,020 | 0,005 | 0,413 | 3,875 | 0,000 |
| Prices of Round Scad | 0,003 | 0,005 | 0,101 | 0,953 | 0,346 |
| Prices of Skipjack Tuna | 0,006 | 0,002 | 0,305 | 3,340 | 0,002 |
| Prices of Rice | -0,003 | 0,008 | -0,023 | -0,330 | 0,743 |
| Income | 1,253 | 0,000 | 0,275 | 3,384 | 0,002 |

The multiple linear regression equations obtained based on the results of data analysis in Table 13 are as follows:

$$Y = -435{,}557 + 0{,}020X_1 + 0{,}003X_2 + 0{,}006X_3 - 0{,}003X_4 + 1{,}253X_5$$

The regression coefficient value for each independent variable illustrates if the independent variable increases by one unit and the value of the other independent variables is constant or equal to zero, the value of the dependent variable is estimated to rise or fall according to the sign of the regression variable of the independent variable. The independent variable regression coefficient sign shows the direction of the relationship of the variable concerned with the dependent variable, namely the demand for milkfish.

Regression coefficients for independent variables X1 X2 X3 and X5 are positive, which means that there is a unidirectional relationship between the price of milkfish, the price of round scad the price of skipjack tuna, and income to demand for milkfish. The regression coefficients of X1 X2 X3 and X5 variables are 0.020; 0,003; 0,006; 2,353 shows that every price of milkfish increase, price of round scad, price of skipjack tuna, and income of one unit will cause an increase in demand for milkfish by 0,020; 0,003; 0,006; 2,353 units. The variable regression coefficient X4 is negative, this shows that the relationship between the price of rice and the demand for milkfish is not in the same direction.

## Elasticity of Demand Marine Fish Consumption

Elasticity or degree of sensitivity of the function of demand to changes in prices, both the price of the goods themselves and the prices of other goods, also income can be known by looking at each related variable. The analysis of the demand elasticity of marine fish in the Caringin Central Market in Bandung City is divided into 3 namely demand elasticity for skipjack tuna, elasticity of demand for round scad, elasticity of demand for milkfish whose results include price elasticity, cross elasticity, and income elasticity.

## Elasticiy of Demand Skipjack for Tuna

The following are the results of the elasticity of demand for skipjack tuna based on the variables presented in Table 14.

Table 14 : Elasticity Value of Skipjack Tuna

| Variable | Elasticity Value | | |
|---|---|---|---|
| | Price | Cross | Income |
| Prices of Skipjack Tuna | 0,37 | | |
| Prices of Round Scad | | 0,32 | |
| Prices of Milkfish | | 0,50 | |
| Price of Rice | | -0,88 | |
| Income | | | 1,2 |

a. Price elasticity

Based on Table 14 above it can be seen that the coefficient of the price elasticity of skipjack tuna is equal to 0.37 and is inelastic because Ep <1. This happens if the percentage change in demand is smaller than the percentage change in price. The positive elasticity value also shows that the price variable of skipjack tuna has a relationship that is directly proportional to the demand for skipjack tuna. It means that if there is an increase in the price of skipjack tuna by 1% then the percentage increase in demand for skipjack tuna also increases by 0.37% and vice versa.

b. Cross Elasticity

Based on the results of the analysis, it is known that the value of the cross elasticity of skipjack fish to changes in the price of round scad is 0.32. This means that if the price of fly fish rises by 1%, the demand for skipjack tuna will increase by 0.32%. The value of elasticity with a positive sign shows that round scad is substitute goods (substitute) from skipjack tuna. This is because the round

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scad are classified as marine fish that are in great demand.

The coefficient of cross elasticity of skipjack tuna against milkfish is 0.50. This means that if milkfish experience a price increase of 1%, the demand for skipjack will increase by 0,50% and vice versa. The value of elasticity with a positive sign also shows that milkfish is a substitute item (substitute) from skipjack tuna. This is because milkfish is the most popular marine fish after skipjack tuna.

The coefficient of cross-elasticity of skipjack tuna on rice prices is -0.88, which means that if the price of rice increase 1%, the demand for rice will decrease by 0.88% and vice versa. The rice elasticity value that is negative indicates that the relationship between variables is inversely proportional (if the price rises, the demand decreases, if the price drops the demand rises) besides the negative sign on the coefficient of elasticity also shows that rice is complementary rather than substitute goods.

c. Income Elasticity

Based on the results in Table 14, it is known that the income elasticity of skipjack tuna is 1.2, which means that if income rises by 1% it will increase demand for skipjack tuna by 1.2% and vice versa. Ei> 1 coefficient value or elastic, means that people tend to spend more income on an item (Salvatore 2006). Positive income elasticity values indicate that skipjack tuna is a normal item, in this case it means that the number of requested skipjack tuna will increase if the income also rises. According to Sukirno (2013) an item is called normal if the item has increased demand as a result of an increase in income.

## Elasticiy of Demand for Round Scad

The analysis of the elasticity of demand for round scad based on individually influential variables can be seen in Table 15 below.

Table 15 : Elasticity Value of Round Scad

| Variable | Elasticity Value | | |
|---|---|---|---|
| | Price | Cross | Income |
| Price of Round Scad | 0,26 | | |
| Price of Skipjack Tuna | | 0,30 | |
| Price of Milkfish | | 0,41 | |
| Price of Rice | | -0,72 | |
| Income | | | 0 |

a. Price elasticity

Based on the results of the analysis, it can be seen that the coefficient of the value of the round scad price elasticity is 0.26 and is inelastic because Ep <1. This happens if the percentage change in demand is smaller than the percentage change in price. The value of positive elasticity also shows that the variable prices of round scad have a relationship that is directly proportional to the demand for round scad. It means that if there is an increase in the price of round scad by 1% then the percentage increase in demand for round scad also increases by 0.26% and vice versa.

b. Cross Elasticity

Based on the results of the analysis (Table 15) it is known that the value of cross elasticity of round scad to changes in the price of skipjack tuna is 0.30 this means that if the price of skipjack is up 1% then the demand for fly fish will increase by 0.30% and vice versa. The value of elasticity with a positive sign shows that skipjack tuna is a substitute goods from round scad. This is because the skipjack is the most popular marine fish.

The coefficient of cross elasticity of round scad on milkfish is 0.41. This means that if milkfish experience a price increase of 1%, the demand for round scad will increase by 0.41% and vice versa. The value of elasticity with a positive sign also shows that milkfish is substitute goods from round scad. This is because milkfish is being the most wanted marine fish consumption.

The coefficient of cross elasticity of round scad on rice prices is equal to -0.72, which means that if the price of rice rises by 1%, the demand for rice will decrease by 0.72% and vice versa. The rice elasticity value that is negative indicates that the relationship between variables is inversely proportional (if the price rises, the demand decreases, if the price drops the demand rises) besides the negative sign on the coefficient of elasticity also shows that rice is complementary rather than substitute goods.

c. Income Elasticity

The coefficient of elasticity of round scad income (Table 15) is 0 means that if the income rises by 1%, the demand for round scad does not increase or vice versa. Ei value = 0 means that this elasticity is perfectly inelastic, this happens when the number of requests is always fixed and does not change at any increase in income level. Round scad in this situation belong to essential goods, which according to Sukirno (2013) shopping for these goods will not change even though income changes.

## Elasticity of Demand for Milkfish

Analysis of demand elasticity of milkfish based on individually influential variables can be seen in Table 16 below.

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Table 16 : Elasticity Value of Milkfish

| Variable | Elasticity Value | | |
|---|---|---|---|
| | Price | Cross | Income |
| Prices of Milkfish | 0,74 | | |
| Price of Round Scad | | 0,48 | |
| Price of Skipjack Tuna | | 0,54 | |
| Price of Rice | | -1,29 | |
| Income | | | 2,9 |

a. Price elasticity

Based on the results of the analysis it can be seen that the coefficient of the price elasticity of milkfish is equal to 0.74 and is inelastic because Ep <1. This happens if the percentage change in demand is smaller than the percentage change in price. The positive elasticity value also shows that the price variable of milkfish has a relationship that is directly proportional to the demand. It means that if there is an increase in the price of milkfish by 1% then the percentage increase in demand for milkfish also increases by 0.74% and vice versa.

b. Cross Elasticity

Based on the results of the analysis, it is known that the value of cross elasticity of milkfish to changes in the price of round scad is 0.48 this means that if the price of round scad increase 1%, the demand for milkfish will increase by 0.48% and vice versa. The value of elasticity with a positive sign also shows that round scad are substitute goods from milkfish. This is because the round scad are classified as the most wanted marine fish consumption.

The coefficient of cross elasticity of milkfish on skipjack tuna is equal to 0.54. This means that if the skipjack tuna experience a price increase of 1%, the demand for milkfish will increase by 0,54% and vice versa. The value of elasticity with a positive sign also shows that skipjack tuna is a substitute item from milkfish. This is because the skipjack tuna is the most popular marine fish.

The coefficient of cross elasticity of milkfish on the price of rice is equal to -1.29 which means that if the price of rice rises by 1% then the demand for rice will decrease by 1.29% and vice versa. The rice elasticity value that is negative indicates that the relationship between variables is inversely proportional (if the price increase, the demand decreases, if the price decrease the demand increases) besides the negative sign on the coefficient of elasticity also shows that rice is complementary rather than substitute goods.

c. Income Elasticity

Based on the results in Table 16, it can be seen that the income elasticity of milkfish is 2.9, which means that if income rises 1%, the demand for milkfish will increase by 2.9% and vice versa. Similar to skipjack fish the Ep> 1 coefficient value is elastic, meaning someone tends to spend more income on an item (Salvatore 2006). The value of income elasticity that has a positive sign indicates that skipjack is a normal item. According to Sukirno (2013) an item is called normal if the item has increased demand as a result of an increase in income.

## Discussion

Provider of the largest consumption of sea fish in the city of Bandung is located in the Caringin Central Market. Consumed sea fish that have an important role in the city of Bandung, namely skipjack tuna, round scad, and milkfish because those are the most influence marine fish consumption. Demand for consumption of marine fish is expected to continue to increase over time, this is indicated by the number of fish consumption in the city of Bandung which is always increasing every year, besides the Food and Agriculture Office of the City of Bandung has a program that likes to eat fish since 2017. Marine fish is one of the animal protein-sourced foods that has a low consumption rate compared to chicken and beef, although according to Irianto (2009) there are many benefits in consuming fish, marine fish are rich in protein, omega-3, essential acids and minerals.

Based on the analysis of the test statistics the correlation of demand for consumption of sea fish (skipjack tuna, round scad, milkfish) in the Caringin Central Market in succession has a correlation value r = 0.892; r = 0.904; r = 0.894, the three of which are at intervals of 0.8-1, which means that the dependent variable is the demand for consumption sea fish has a very strong relationship to the independent variables (prices of skipjack tuna, round scad prices, milkfish prices, rice prices, and income). The value of r is also positive, which means that the relationship between independent variables is in the same direction or is directly proportional to the dependent variable.

The coefficient of determination, the demand for skipjack tuna is 0.796, which means 79.6% of the demand for skipjack tuna is influenced by the independent variables, namely the price of skipjack tuna, round scad prices, milkfish prices, rice prices, and income. The coefficient of determination on the demand for round scad is 0.818, which means that 81.8% of the demand for round scad is influenced by the independent variables namely round scad prices, skipjack tuna prices, milkfish prices, rice prices, and income. The coefficient determination value on the demand for milkfish is 0.799, which means that 79.9% of the demand for milkfish is influenced by the independent variables namely milkfish prices, round scad prices, skipjack tuna prices, rice prices, and income, while the

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remainder is influenced by variables not included research such as population, people's taste, and expectations.

Based on the results of analysis of variance, it can be seen that the demand for the three fish (skipjack tuna, round scad, milkfish) has the same significance value of 0,000 this value is smaller than α = 0.05 and Ha is accepted and Ho is rejected, which means that each independent variable jointly has a significant effect on the demand for consumption of marine fish at the 95% confidence level. The calculated F value on the demand for skipjack tuna is 34,239 F count values on the demand for round scad of 39,462 and the calculated F value on the demand for milkfish is 34,939 and the F value of the table obtained is equal to 2.43 which means the F value of the three values is greater than F table (Fhit> Ftab), meaning that the effect of independent variables together has a significant effect on changes in each dependent variable value (demand for skipjack tuna, demand for round scad, and demand for milkfish).

The t-test analysis on skipjack tuna showed variables that significantly affected the demand for skipjack tuna, the price of skipjack tuna, milkfish prices, and income while the price of round scad and rice prices did not significantly affect the demand for skipjack tuna because of the value of round scad prices and the price of rice is smaller than t-table. The t-test results on the demand for round scad show that the price of round scad, the price of skipjack tuna, the price of milkfish, and income have a significant influence on the demand for round scad while the price of rice has no significant effect. The t test on milkfish shows that the price of milkfish, the price of skipjack tuna, and income have a significant influence on the demand for milkfish because it has a t-count value that is greater than t-table, while the price of fly fish and rice prices do not significantly affect against demand for milkfish.

The demand elasticity of the prices of skipjack tuna, round scad, and milkfish in the Induk Caringin Market are both inelastic because they have an Eh value <1. This is supported by Wahyuni's research (2016) which results in inelastic fish price elasticity values. An item is said to be inelastic if the percentage change in price is greater than the percentage change in the quantity of goods requested (Sukirno 2013). This situation occurs because skipjack tuna, round scad, and milkfish have become basic necessities so that even though there is an increase in prices, people tend to still buy it but with a smaller increase. The price of elastistas in succession in skipjack tuna, round scad, and milkfish is 0.37; 0.26; 0.74, which means that if there is a price increase of 1%, the percentage increase in demand for skipjack tuna, round scad, and milkfish will also increase by 0.37%; 0.26%; 0.74%.

Cross elasticity of demand for skipjack tuna fish consists of cross elasticity of round scad prices, cross elasticity of milkfish prices, and cross elasticity of rice prices. The cross elasticity coefficient value of round scad prices, milkfish prices and rice prices are respectively 0.32; 0.50; -0.88. E value <1 means that the response to the number of requests requested is smaller than the change in price. Based on the results of the analysis of the price of round scad and the price of milkfish together have a positive value, this shows that round scad and milk fish are substitutes of skipjack tuna. This is because rounnd scad and milkfish are the most sought after fish, making them an alternative choice after skipjack tuna. The cross elasticity coefficient value of rice with a negative sign means that rice is a complementary item not substitute goods.

Cross elasticity of the demand for round scad consists of cross elasticity of prices of skipjack tuna, cross elasticity of milkfish prices, and cross elasticity of rice prices. The value of cross elasticity coefficient of skipjack tuna prices, milkfish prices and rice prices are respectively 0.30; 0.41; -0.72. E value <1 means that the response to the number of requests requested is smaller than the change in price. Based on the results of the price analysis of skipjack tuna and the price of milkfish has a positive value, this indicates that skipjack and milkfish are substitutes of round scad. This is due to the fact that skipjack tuna and milkfish are the most popular fish in the market. The cross elasticity coefficient value of rice with a negative sign means that rice is a complementary item not substitute goods.

The cross elasticity of the demand for milkfish consists of cross elasticity of the price of round scad, cross elasticity of the price of skipjack tuna, and cross elasticity of the price of rice. The cross elasticity coefficient value of round scad prices, skipjack prices and rice prices are 0.48; 0.54; -1.29. The value of E <1 on cross elasticity of round scad and skipjack tuna prices means that the response to the number of requests requested is smaller than the price change, while the value of E> 1 in rice price elasticity means that the demand will change with a percentage that exceeds the percentage change in price (Sukirno 2013 ) or in other words buyers are responsive to price changes. Based on the results of the analysis of the price of round scad and the price of skipjack tuna, both of them have positive marked values, this shows that round scad and skipjack tuna are substitutes of milkfish. This is because round scad and skipjack tuna are the most popular fish, so they are an alternative choice after milkfish. The cross elasticity coefficient value of rice with a negative sign means that rice is a complementary item not substitute.

The income elasticity coefficient value for demand for skipjack tuna, demand for round scad, and demand for milkfish are 1.2 ; 0 ; 2.9. The income elasticity coefficient value on the demand for skipjack tuna and milkfish is positive, meaning that skipjack tuna and milkfish are classified into normal goods. According to Sukirno (2013) an item can be said to be normal if the item experiences an increase in demand as a result of an increase in income. The demand for skipjack tuna and the demand for milkfish produce E> 1 or elastic, meaning that if there is an increase in income it will cause an increase in demand. Sudarsono (1991) states that income is one of the main elements that supports consumer purchasing power. This E> 1 value is also supported by Virgantari's research (2011) which states that the value of fish expenditure elasticity on total food expenditure is greater than one or elastic.

Different with to the income elasticity of skipjack tuna and the income elasticity of milkfish, round scad have a value of zero elasticity of income. Value E = 0 or perfectly inelastic, this occurs when the number of requests is always fixed and does not change at any increase in income level. Round scad in this situation are classified as essential goods, this can be caused by the price of round scad is relatively stable and relatively cheaper than other marine fish consumption, which create expectations that prices will not change significantly which will make consumers tend to buy according to their needs.

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## CONCLUSION

Based on the results of research conducted at the Caringin Central Market, the following conclusions can be drawn: Factors that influence the demand for marine fish consumption is prices of skipjack tuna, round scad prices, milkfish prices, rice prices, and income. The price elasticity and cross elasticity values obtained in the three marine fish consumption are inelastic except the cross elasticity value of rice prices for elastic milkfish demand. The income elasticity of demand for skipjack tuna and milkfish has an elastic value while the value of income elasticity for demand for round scad has perfectly inelastic.

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