

Analysis Of Demand For Indonesian Frozen Fish Exports In The Chinese Market

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Abstract

This research aims to analyse the factors influencing the demand for Indonesian frozen fish in the Chinese market. The study was conducted from November 2024 to March 2025. The data used are secondary time series data in quarterly form from 2016 to 2023, obtained through literature from relevant institutions. The analytical method employed is multiple linear regression analysis. The results show that the demand for Indonesian frozen fish exports is simultaneously influenced by China's GDP, exchange rate, Indonesian frozen fish prices, import tariffs, and the population of China, with a significant influence of 96.6257%. Partially, the variables of Indonesian frozen fish prices and import tariffs have a positive and significant effect on the demand for Indonesian frozen fish exports in the Chinese market, while China's GDP, exchange rate, and population have a negative and insignificant effect on the demand.

Keywords: frozen fish demand, frozen fish price, GDP China, import tariffs, the population of China.

INTRODUCTION

The global economy significantly influences a country's development. To boost economic growth, each country must develop leading sectors that are competitive in international trade. According to Todaro and Smith (2020), international trade is a crucial factor in economic development because it can increase national income and create jobs. Rapid global economic growth, coupled with increasing global demand for various commodities, has led to increasingly fierce competition between countries for resources and export market share. Exports are a key driver of industrial and economic growth. According to Krugman and Obstfeld (2018), free trade



provides significant opportunities for developing countries to increase the competitiveness of their export products, including in the fisheries sector. Indonesia, as an archipelagic nation with a water area of 5.8 million km² and a coastline of 108,000 km, has significant potential in the fisheries sector (Ministry of Maritime Affairs and Fisheries, 2022). Having abundant marine resources, Indonesia has a great opportunity to become a major exporter of fishery products, one of which is frozen fish. Fish consumption in Asia is very high, driven by a culinary culture that prioritizes seafood and a growing awareness of healthy eating. According to the Food and Agriculture Organization (2021), fish consumption continues to rise in line with population growth and changing lifestyles. Hidayat (2022) added that awareness of the nutritional benefits of fish, along with food trends such as sushi and other seafood dishes, has driven increased demand for frozen fish in the international market.

With this opportunity, Indonesia has significant potential to increase frozen fish exports to countries with high demand for fishery products. However, to achieve this success, Indonesia must understand the factors influencing frozen fish demand, such as Gross Domestic Product (GDP), exchange rates, prices, import tariffs, and the population of importing countries, in order to implement a more effective export strategy oriented towards the sustainability of the fisheries industry. As Indonesia's main trading partner, China has shown a positive trend of increasing exports. Indonesian exports to China experienced a significant increase from 49,059 tons in 2016 to a peak of 144,380 tons in 2020.

According to the Food and Agriculture Organization (2023), Indonesia is among the countries with the highest fisheries production. The Ministry of Maritime Affairs and Fisheries (2023) also emphasized that strengthening the exchange rate, competitive product prices, government policies, and knowledge of population information in importing countries are important factors in increasing the competitiveness of Indonesian frozen fish exports. Therefore, Indonesia needs to analyze the factors that influence the demand for frozen fish. Understanding these factors can be key to maintaining Indonesia's position and dominating the Chinese market (Damanhuri, 2021). Therefore, the purpose of this study is to analyze the factors that influence the demand for Indonesian frozen fish exports in the Chinese market.

METHOD

This research was conducted in Indonesia. The location was chosen deliberately considering that Indonesia has vast marine resources, Indonesia has the potential to become the largest frozen fish exporter to the Chinese market. This research was conducted from November 2024 to March 2025. The type of data used in this research is secondary data in the form of





quarterly quantitative figures (*time series*) from 2016 to 2023. This study uses dependent and independent variables. The dependent variable is the demand for frozen Indonesian fish in the Chinese market. The independent variables are China's GDP, exchange rate, frozen fish prices, import tariffs, and population. In this study, the data collection method used was the documentation method. The analytical methods used in this study are descriptive statistics, classical assumption tests, multiple linear regression analysis, and hypothesis testing. This study uses software EViews 13 to assist in processing research data. The analysis method in this study is presented as follows:

1. Descriptive statistical analysis

used to describe or illustrate data seen from the average value (*mean*), standard deviation, variance, maximum (*max*), minimum (*min*), sum, *range*, kurtosis and skewness (distribution skewness) (Ghozali, 2013). Descriptive statistics are used to provide an overview or description of the variables examined in this study.

2. Classical Assumption Test Analysis

The classical assumption test is used to ensure that the data used in the study are normally distributed and free from multicollinearity, heteroscedasticity, and autocorrelation. This is a good requirement for estimating multiple linear regression analysis using the method. *Ordinary Least Squares* (OLS) is the fulfillment of four classical assumptions (Normality, Multicollinearity, Heteroscedasticity and Autocorrelation) (Prasetyanandini, 2016).

3. Multiple Linear Regression Analysis

Regression analysis is a study of the dependence of dependent variables (*dependent*) on one or more independent variables (*independent*) (Gujarati and Porter, 2015). Regression aims to estimate or predict the average value of the dependent variable (*dependent*) based on the value of the independent variable (*independent*). The estimation method used in this study is *Ordinary Least Squares* (OLS) or the least squares method. OLS is a regression method that uses a simple least squares error method (Ekananda, 2015). The linear regression equation model in this study is as follows:

$$Y_t = \alpha + \beta_1(X_1) + \beta_2(X_2) + \beta_3(X_3) + \beta_4(X_4) + \beta_5(X_5) + \mu$$

Information:

α	= Intercept
$\beta_1 \beta_2 \beta_3 \beta_4 \beta_5$	= Parameters to be estimated
Y_t	= Demand for Indonesian Frozen Fish Exports in the Chinese Market
X_1	= Gross Domestic Product China
X_2	= Exchange rate



X3 = Price of Frozen Indonesian Fish in the Chinese Market

X4 = Pull Import

X5 = Population of China

μ = error

1. Hypothesis Test Analysis

Hypothesis testing is a response to initial responses to the research problem formulation. Hypothesis testing in this study uses the F-test and the T-test

RESULTS AND DISCUSSION

Multiple Linear Regression Analysis

Table 1. Multiple Linear Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-363.000,0	174.000,0	-2,088068	0,0467
PDB China	-20,21426	22,76854	-0,887815	0,3828
Exchange Value	-705,8114	1260,431	-0,559976	0,5803
Indonesian Fish Prices	0,032997	0,004206	7,844842	0,0000
Import Tariffs	3,457411	0,163307	21,17129	0,0000
Total Population of China	0,245558	0,133632	1,837569	0,0776
R-squared	0,966257	Mean dependent var		22.723,306
Adjusted R-squared	0,959768	S.D. dependent var		8.398,742
S.E. of regression	1.684,604	Akaike info criterion		31,67932
Sum squared resid	73.800,00	Schwarz criterion		31,95414
Log likelihood	-500,8691	Hannan-Quinn criter.		31,77042
F-statistic	148,9078	Durbin-Watson stat		1,120722
Prob(F-statistic)	0,000000			

Source: Processed data, 2025

Multiple linear regression aims to estimate or predict the magnitude of the influence between the independent variables, namely China's GDP (X1), Exchange Rate (X2), Price of Indonesian frozen fish (X3), Import Tariff (X4) and Chinese Population (X5) on the dependent variable, namely Demand for Indonesian Frozen Fish in the Chinese Market (Y). Based on Table 4.10, the multiple linear regression model equation is obtained as follows:

$$Y = -363.000,0 - 20.21426X_1 - 705.8114X_2 + 0.032997X_3 + 3.457411X_4 + 0.245558X_5$$

The above equation can be interpreted as follows:

1. costing

The constant shown in the equation above is $a = -363,000.0$, which means that if the independent variables of China's GDP (X1), Exchange Rate (X2), Frozen Fish Price (X3), Import Tariff (X4), and Chinese Population (X5) are considered zero, then the average Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) is $-363,000.0$

2. China's GDP Variable Coefficient (X1)

The coefficient of China's GDP variable (X1) in the equation has a value of -20.21426 . This coefficient indicates that China's GDP (X1) has a negative relationship with Indonesia's Frozen Fish Export Demand in the Chinese Market (Y). When China's GDP (X1) increases by 1 unit, Indonesia's Frozen Fish Export Demand in the Chinese Market (Y) will decrease by -20.21426 units assuming that other independent variables are held constant. Conversely, if China's GDP (X1) decreases by 1 unit, it will cause an increase in Indonesia's Frozen Fish Export Demand in the Chinese Market (Y) by -20.21426 units.

3. Exchange Rate Variable Coefficient (X2)

The coefficient of the Exchange Rate variable (X2) in the equation has a value of -705.8114 . This coefficient indicates that the Exchange Rate (X2) has a negative relationship with the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y). When the Exchange Rate (X2) increases by 1 unit, the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) will decrease by -705.8114 units assuming that the other independent variables are considered constant. Conversely, if the Exchange Rate (X2) decreases by 1 unit, it will cause an increase in the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) by -705.8114 units.

4. Indonesian Frozen Fish Price Variable Coefficient (X3)

The coefficient of the Indonesian Frozen Fish Price variable (X3) in the equation has a value of 0.032997 . This coefficient indicates that the Indonesian Frozen Fish Price (X3) has a positive relationship with the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y). When the Indonesian Frozen Fish Price (X3) increases by 1 unit, the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) will increase by 0.032997 units assuming that other independent variables are considered constant. Conversely, if the Indonesian Frozen Fish Price (X3) decreases by 1 unit, it will cause a decrease in the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) by 0.032997 units.

5. Import Tariff Variable Coefficient (X4)

The coefficient of the Import Tariff variable (X4) in the equation has a value of 3.457411 . This coefficient indicates that the Import Tariff (X4) has a Negative relationship with the Demand

for Indonesian Frozen Fish Exports in the Chinese Market (Y). When the Import Tariff (X4) increases by 1 unit, the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) will decrease by 3.457411 units assuming that other independent variables are considered constant. Conversely, if the Import Tariff (X4) decreases by 1 unit, it will cause an increase in the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) by 3.457411 units.

6. Coefficient of China Population Variable (X5)

The coefficient of the Chinese Population (X5) variable in the equation has a value of 0.245558. This coefficient indicates that the Chinese Population (X5) has a negative relationship with the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y). When the Chinese Population (X5) increases by 1 unit, the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) will decrease by 0.245558 units, assuming that the other independent variables are held constant. Conversely, if the Chinese Population (X5) decreases by 1 unit, it will cause an increase in the Demand for Indonesian Frozen Fish Exports in the Chinese Market (Y) by 0.245558 units.

Hypothesis Testing Results

1. Simultaneous Test (F Test)

Simultaneous or F Test is used to determine whether or not there is a simultaneous influence between the independent variables, namely China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariffs (X4), and Population of China (X5) on the dependent variable Demand for Frozen Fish Exports in Indonesia (Y). The hypothesis is as follows: H0: Simultaneously, there is no significant influence between the independent variables of China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariffs (X4), and Population of China (X5) on the dependent variable of Demand for Indonesian Frozen Fish Exports (Y).

H1: Simultaneously, there is a significant influence between the independent variables of China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariffs (X4), and Population of China (X5) on the dependent variable of Demand for Indonesian Frozen Fish Exports (Y).

The basis for decision making from the results of the simultaneous test (F Test) is as follows:

- If the Prob (F-statistic) value $> \alpha$ (0.05), then H0 is accepted.
- If the Prob (F-statistic) value $< \alpha$ (0.05), then H0 is rejected.

Based on Table 4.10, the probability value (*F-statistic*) is $0.000000 < \alpha$ (0.05), smaller than the required significance level, meaning H0 is rejected. Thus, it can be concluded that

simultaneously China's GDP (X1), Exchange Rate (X2), Indonesian Frozen Fish Price (X3), Import Tariff (X4), and Population (X5) have a significant influence on the variable Demand for Indonesian Frozen Fish Exports (Y).

2. Partial Test (T-Test)

The partial test (T-test) is used to determine the effect of each independent variable on the dependent variable. The hypothesis used in this test is as follows:

a. Variable X1 against Y

H0 = Partially, there is no significant influence between the Chinese GDP variable (X1) on Indonesia's Frozen Fish Export Demand (Y).

H1 = Partially, there is a significant influence between the Chinese GDP variable (X1) on Indonesia's Frozen Fish Export Demand (Y).

b. Variable X2 against Y

H0 = Partially, there is no significant influence between the Rupiah Exchange Rate variable (X2) on Indonesia's Frozen Fish Export Demand (Y).

H1 = Partially, there is a significant influence between the Rupiah Exchange Rate variable (X2) on Indonesia's Frozen Fish Export Demand (Y).

c. Variable X3 against Y

H0 = Partially, there is no significant influence between the variable Price of Frozen Fish in Indonesia (X3) on Demand for Frozen Fish Exports in Indonesia (Y).

H1 = Partially, there is a significant influence between the variables of the Price of Frozen Fish in Indonesia (X3) on the Demand for Frozen Fish Exports in Indonesia (Y).

d. Variable X4 against Y

H0 = Partially, there is no significant influence between the Import Tariff variable (X4) on Indonesia's Frozen Fish Export Demand (Y).

H1 = Partially, there is a significant influence between the Import Tariff variable (X4) on Indonesia's Frozen Fish Export Demand (Y).

e. Variable X5 against Y

H0 = Partially, there is no significant influence between the variable of Chinese Population (X5) on Indonesia's Frozen Fish Export Demand (Y).

H1 = Partially, there is a significant influence between the variable of Chinese Population (X5) on Indonesia's Frozen Fish Export Demand (Y).

The basis for making decisions from the results of the partial test (T-Test) is to use the significance level:

a. If Probability > α (0.05), then H0 is accepted.

b. If Probability $< \alpha$ (0.05), then H_0 is rejected.

Based on Table 1, the results of multiple linear regression, the T-test results are as follows:

a. Variable X1 against Y

China's GDP variable (X1) has a probability value of 0.3828. This probability value is greater than the required significance level, which is $0.3828 > \alpha$ (0.05), so H_0 is accepted. Thus, it can be concluded that partially China's GDP variable (X1) does not have a significant effect on Indonesia's Frozen Fish Export Demand (Y).

b. Variable X2 against Y

The Exchange Rate variable (X2) has a probability value of 0.5803. This probability value is greater than the required significance level, which is $0.5803 > \alpha$ (0.05), so H_0 is accepted. Thus, it can be concluded that partially the Exchange Rate variable (X2) does not have a significant effect on Indonesia's Frozen Fish Export Demand (Y).

c. Variable X3 against Y

The Indonesian Frozen Fish Price variable (X3) has a probability value of 0.0000. This probability value is smaller than the required significance level, which is $0.0000 < \alpha$ (0.05), meaning H_0 is rejected. Thus, it can be concluded that partially there is a significant influence between the Indonesian Frozen Fish Price variable (X3) on the Demand for Indonesian Frozen Fish Exports (Y).

d. Variable X4 against Y

The Import Tariff variable (X4) has a probability value of 0.0000. This probability value is smaller than the required significance level, which is $0.0000 < \alpha$ (0.05), meaning H_0 is rejected. Thus, it can be concluded that partially there is a significant influence between the Import Tariff variable (X4) on Indonesia's Frozen Fish Export Demand (Y).

e. Variable X5 against Y

The Chinese Population (X5) variable has a probability value of 0.0776. This probability value is greater than the required significance level, which is $0.0776 > \alpha$ (0.05), so H_0 is accepted. Thus, it can be concluded that partially the Chinese Population (X5) variable does not have a significant effect on Indonesia's Frozen Fish Export Demand (Y).

3. Coefficient of Determination (R^2)

The coefficient of determination is used to determine the extent of the contribution of all independent variables, namely China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariffs (X4), and the Population of China (X5) which influence the dependent variable, namely Demand for Frozen Fish Exports in Indonesia (Y). Based on Table 4.10, the value can be seen *R-squared* is 0.966257. This value means that all independent variables in

this study, namely China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariff (X4), and Population of China (X5) have an influence of 96.6257% on the dependent variable, namely Demand for Frozen Fish Exports in Indonesia (Y), while the remaining 3.3743% is influenced by other independent variables (X) that are not explained in this study.

Interpretation of Research Results

The following is a further discussion regarding the regression model that has been carried out:

1. China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariff (X4), and Population (X5) on Demand for Frozen Fish Exports in Indonesia (Y)

The results of the hypothesis 1 test are the results of calculations from the simultaneous test (F test). Based on the results of the F test, it can be concluded that China's GDP (X1), Exchange Rate (X2), Price of Frozen Fish in Indonesia (X3), Import Tariffs (X4), and Population (X5) simultaneously have a significant effect on the Demand for Frozen Fish Exports in Indonesia (Y), with a value of R^2 96.6257%, while the remaining 3.3743% is influenced by other independent variables (X) not explained in this study. Based on this, the first hypothesis in this study can be accepted. The results of this study are in accordance with research conducted by Riyani et al. (2018) stated that China's demand for Indonesian agricultural commodity exports was significantly influenced by China's real GDP per capita, the real exchange rate of the Rupiah, agricultural commodity export prices and agricultural commodity import tariffs in China.

2. China's GDP (X1) on Indonesia's Frozen Fish Export Demand (Y)

The results of the second hypothesis test are the results of the t-test calculation which shows that China's GDP (X1) partially has no significant effect on Indonesia's Frozen Fish Export Demand (Y). Based on this, the second hypothesis in this study cannot be accepted. The results of this study are in accordance with research conducted by Maziya et al. (2016) stated that importer GDP does not affect Export Demand for Swazi Sugar.

3. Exchange Rate (X2) on Demand for Indonesian Frozen Fish Exports (Y)

The results of the hypothesis 3 test are the results of the t-test calculation which shows that partially the Exchange Rate (X2) does not have a significant effect on Indonesia's Frozen Fish Export Demand (Y). Based on this, the third hypothesis in this study cannot be accepted. The results of this study are in accordance with research conducted by Dwiyani et al. (2021) which states that partially the currency exchange rate variable does not have a significant effect on the volume of copra exports in Indonesia.

4. Price of Frozen Fish in Indonesia (X3) against Demand for Frozen Fish Exports in Indonesia (Y)

The results of the hypothesis 4 test are the results of the t-test calculation which shows that partially the Price of Frozen Fish in Indonesia (X3) has a positive and significant influence on the Demand for Frozen Fish Exports in Indonesia (Y). Based on this, the fourth hypothesis in this study can be accepted. The results of this study are in accordance with research conducted by Setyawati et al. (2014) stated that the variables that influence the demand for Indonesian natural rubber exports to the United States are the quantity of natural rubber, the price of natural rubber, the price of natural rubber last year, and the price of synthetic rubber.

5. Import Tariff (X4) on Indonesian Frozen Fish Export Demand (Y)

The results of the hypothesis 5 test are the results of the t-test calculation which shows that partially the Import Tariff (X4) has a positive and significant influence on the Demand for Indonesian Frozen Fish Exports (Y). Based on this, the fifth hypothesis in this study can be accepted. The results of this study are in accordance with research conducted by Nanang (2010) which stated that the tariff policy created significantly reduced export demand for Ghanaian wood products.

6. China's Population (X5) on Indonesia's Frozen Fish Export Demand (Y)

The results of the hypothesis 6 test are the results of the t-test calculation which shows that partially the Chinese Population (X5) does not have a significant effect on Indonesia's Frozen Fish Export Demand (Y). Based on this, the sixth hypothesis in this study cannot be accepted. The results of this study are in accordance with research conducted by Setyawati et al. (2014) stated that the population variable does not affect the demand for Indonesian natural rubber exports to the United States.

CONCLUSION

Based on research that has been conducted regarding the analysis of demand for Indonesian frozen fish exports in the Chinese market in 2016-2023 using multiple linear regression analysis, it can be concluded that:

The demand for Indonesian frozen fish exports in the Chinese market is simultaneously influenced by the variables of China's GDP, Exchange Rate, Indonesian Frozen Fish Price, Import Tariff, and Chinese Population, which have a significant influence of 96.6257%. Partially, the variables of Indonesian Frozen Fish Price and Import Tariff have a positive and significant effect on the demand for Indonesian frozen fish exports in the Chinese market, while partially the variables of China's GDP, Exchange Rate, and Chinese Population have a negative and insignificant effect on the demand for Indonesian frozen fish exports in the Chinese market.

Based on the conclusions above, several suggestions can be put forward that are hoped to

be beneficial to the government and frozen fish exporters in Indonesia. These suggestions include:

- 1 The government is expected to increase support for the fisheries sector, particularly in terms of providing adequate market chain infrastructure to maintain the quality of frozen fish during the export process. It also aims to enhance bilateral and multilateral cooperation to open new export markets and reduce trade barriers. It also aims to provide training and outreach to fishermen and businesses on international quality standards to ensure their products are competitive in the global market. It also aims to provide tax incentives or facilitate export licensing for businesses that consistently maintain the quality and volume of their exports.
- 2 Entrepreneurs are expected to pay attention to various information regarding changes in China's GDP, exchange rates, Indonesian frozen fish prices, import tariffs, and China's population, considering that these variables together contribute 96.6257% in influencing Indonesia's frozen fish export demand in the Chinese market. By understanding the development of factors related to China's GDP, exchange rates, Indonesian frozen fish prices, import tariffs, and China's population, losses can be predicted and anticipated, and can be used as a reference for decision-making.
- 3 For further research, this research has limitations so that it is still possible to conduct further research with in-depth studies, such as variables, data, research period, regional coverage and research area.

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