INVEST : Jurnal Inovasi Bisnis dan Akuntansi
Volume 3 No 2 (2022) Page : 249-257

Analysis Of Factors Affecting Indonesian Tuna Exports To The United States In 2010-2021

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ABSTRACT

Tuna is an essential commodity in the fishing and marine industries due to its high economic value and ability to generate foreign exchange for the country. This study aims to see the correlation between the amount of tuna produced in Indonesia, the exchange rate, and the export price of tuna with the volume of Indonesian tuna exports to the United States. This study uses time series data from 2010 to 2021 and uses multiple linear regression (Ordinary Least Square) method for data analysis. The findings of this study reveal that Indonesia's tuna production quantity, exchange rate, and tuna export price jointly affect the amount of Indonesia's tuna exports to the United States. However, the volume of Indonesian tuna production does not have a significant or detrimental impact on the volume of Indonesian tuna exports to the United States. In contrast, the exchange rate and tuna export prices have a negative and significant impact on the volume of Indonesian tuna exports to the United States.

Keywords: *Export Volume, Tuna Production Volume, Exchange Rate, Tuna Export Price*

ABSTRAK

Tuna merupakan salah satu komoditas penting dalam industri perikanan dan kelautan karena memiliki nilai ekonomi yang tinggi dan mampu menghasilkan devisa bagi negara. Penelitian ini bertujuan untuk melihat hubungan antara jumlah produksi tuna di Indonesia, nilai tukar, dan harga ekspor tuna dengan volume ekspor tuna Indonesia ke Amerika Serikat. Penelitian ini menggunakan data time series dari tahun 2010 hingga 2021 dan menggunakan metode regresi linier berganda (Ordinary Least Square) untuk analisis data. Temuan dari penelitian ini mengungkapkan bahwa jumlah produksi tuna Indonesia, nilai tukar, dan harga ekspor tuna secara bersama-sama mempengaruhi jumlah ekspor tuna Indonesia ke Amerika Serikat. Namun, volume produksi tuna Indonesia tidak memiliki dampak yang signifikan atau merugikan terhadap volume ekspor tuna Indonesia ke Amerika Serikat. Sebaliknya, nilai tukar dan harga ekspor tuna memiliki dampak negatif dan signifikan terhadap volume ekspor tuna Indonesia ke Amerika Serikat.

Kata Kunci: Volume Ekspor, Volume Produksi Tuna, Nilai Tukar, Harga Ekspor Tuna

1. Introduction

Promoting economic growth is one of the main benefits of international trade. Typically, international trade arises from a country's scarcity of resources, which can be overcome by acquiring those resources from other countries through trade channels. However, with globalization now a prominent force, the purpose of international trade has shifted to generating profits that will lead

to economic growth. Exporting goods, which is a form of international trade, is vital to a country's economy as it contributes to the country's gross income through the sale of merchandise.

When a country conducts export activities, it generates revenue in the form of foreign currency, known as foreign exchange, which is a source of income for the country. As a result, a decrease in exports will cause a decrease in the country's foreign exchange reserves. (Dananjaya et al., 2019)

Indonesia is recognized as the largest archipelago in the world, with a vast expanse of sea that offers great potential for the marine and fisheries industry. It covers 17,499 islands, stretching from Sabang to Merauke, with a land area of approximately 7.81 million km^2 , of which 3.25 million km^2 is ocean, 2.55 million km^2 is Exclusive Economic Zone, and 2.01 million km^2 is land. Due to its vast maritime area, the marine and fisheries sector is an important contributor to Indonesia's growth and development. One of the country's top marine commodities is tuna, due to its high economic value and potential to generate foreign exchange.

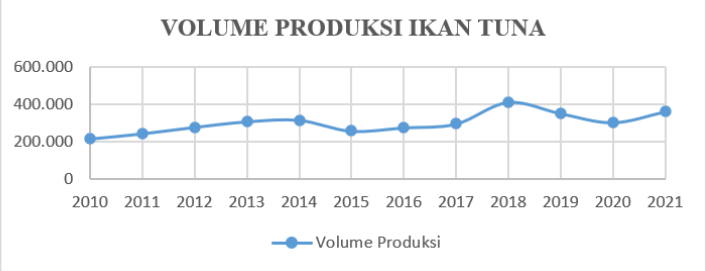

Figure 1. Indonesian Tuna Production Volume 2010-2021

Source: United Nation Commodity Trade 2023, Data Processed

Indonesia is one of the tuna producers that has a major role in world tuna fisheries. Based on Figure 1.1 above, throughout the observation period, tuna capture fisheries commodities show an increase in production every year.

Table 1. Largest Destination Countries for Indonesian Tuna Fish Exports 2010-2021 Unit (kg)

Country	Total
Japan	27.298.063
United States of America	1.835.687
Singapore	176.600
United Arab Emirates	90.700
Australia	43.320

Source: United Nation Commodity Trade 2023, Data Processed

There are several types of tuna fish that are most exported by Indonesia to various countries such as yellowfin tuna, bluefin, and bigeye tuna. Recorded in the *United Nation Commodity Trade, the* largest import volume of tuna fish is occupied by Japan, with an import volume of 27,298,063 kg. Followed by the United States with an import volume of 1,835,687 kg.

With its large tuna output, Indonesia stands as one of the many largest tuna-producing countries in the world, with the potential to dominate the international market for this industry. The variety of tuna products traded worldwide includes live tuna, fresh or chilled tuna, frozen tuna, and canned tuna. Indonesia with its focus on the export market produces an abundance of tuna. Among the top destinations for Indonesian tuna products is the United States, as depicted in Figure 1.2 which shows the total amount of tuna exported to this country.

Figure 2. Volume of Indonesian tuna exports to the United States in 2020-2021

Source: United Nation Commodity Trade, Data Processed

During the observation period from 2010-2021, Indonesia's tuna exports showed a downward trend. In three consecutive years, 2011-2013 and four consecutive years, 2016-2019, tuna exports showed a very significant decline. Indonesia's largest export occurred in 2010 touching 618,399 kg and the lowest export occurred in 2021 amounting to 18,000 kg.

The volume of tuna exported to the United States is subject to many variables that may result in fluctuations, both favorable and unfavorable. Moreover, it is important to analyze the role of each variable in tuna exports to the United States. With that context, this investigation seeks to determine whether the quantity of tuna produced in Indonesia, the exchange rate, and the cost of tuna exports have an impact on the volume of Indonesian tuna exports to the United States

2. Methods

The research conducted by Siregar and Hardana (2022) focuses on the population of Indonesian tuna exports to the United States. The population, in this context, extends beyond living entities to include various natural objects related to tuna exports. The sample for the study encompasses specific aspects such as the quantity of tuna exported, total tuna production in Indonesia, exchange rates, and the cost of tuna exports to the United States. The operational definitions for research variables include the production volume of Indonesian tuna, exchange rates, and the export price of tuna. The dependent variable is the volume of Indonesian tuna exports to the United States, measured in kilograms.

Quantitative data for the research were collected from secondary sources, including BPS, the Ministry of Trade, KKP of the Republic of Indonesia, and UnComtrade. Desk research was employed as the data collection method, involving the extraction of information from various literature sources related to the research topic. The analysis method used is multiple linear regression, executed with IBM SPSS Statistics 25 software. The regression model is represented by the formula $Y = \alpha + \beta_1X_1 + ... + \beta_nX_n + \varepsilon$.

Before proceeding with data analysis, classical assumption tests were conducted to ensure the validity of the regression model. These tests include multicollinearity, heteroscedasticity, and autocorrelation checks. Multicollinearity was assessed using the Variance Inflation Factor (VIF), where a VIF value below 10 indicates the absence of multicollinearity. The Breusch Pagan test was employed to identify heteroscedasticity, with a probability value below 0.05 indicating its presence. The Durbin Watson (DW) test was used for the autocorrelation test.

Additionally, the coefficient of determination (R^2) and adjusted R^2 were examined to evaluate the model's explanatory power. The hypothesis tests involved the F test to assess the significance of the overall equation and t-tests for the individual significance of independent variables. The decision criteria for significance testing were applied to determine the impact of independent variables on the dependent variable either simultaneously or partially. The study's methodology, thus, provides a comprehensive approach to understanding the relationships between various factors influencing Indonesian tuna exports to the United States.

3. Results and Discussion

Multiple Linear Regression Test

Using the IBM SPSS computer program version 25 and the multiple linear regression method, the analysis was carried out. This resulted in the formulation of the multiple linear regression equation, namely:

$$\boldsymbol{Y = 1370383,671 - 0,173X_1 - 82,628X_2 - 13037,870X_3}$$

Based on this equation, the result can be interpreted as:

A. Constant Value (β_0) A number of 1370383,671

Reveals that if the independent variables, namely the volume of Indonesian tuna fish production (X_1), the exchange rate (exchange rate) (X_2), and the export price of tuna fish (X_3) are constant, the result is that Indonesian tuna fish exports to the United States (Y) will decrease by 1370383.671.

B. Regression Coefficient (β_1) A number of -0.173

The data shows that the volume of Indonesian tuna production, which is referred to as the independent variable (X1), has an adverse impact on Indonesian tuna exports to the United States (Y). This can be interpreted as a decrease in Indonesian tuna exports to the United States by 0.173 tons for every one ton increase in production. It is important to note that this conclusion is based on the assumption that X2 and X3 remain constant.

C. Regression Coefficient (β_2) A number of -82.628

The data shows that the exchange rate (X2) is an independent variable that has a detrimental impact on Indonesian tuna exports to the United States (Y). As a result, it can be concluded that an increase in the exchange rate of one rupiah will cause a decrease in Indonesian tuna exports to the United States by Rp82,628 (Y). This applies assuming that X1 and X3 remain constant.

D. Regression Coefficient (β_3) A number of -13037,870

Based on these findings, the stand-alone variable, namely the cost of Indonesian tuna exports to the United States (X3), has a detrimental impact on the total amount of Indonesian tuna exports to the United States (Y). From this it can be concluded that if the cost of tuna exports (X3) decreases by one dollar, there will be an increase of 13,037.870 kg in the amount of Indonesian tuna exports to the United States (Y), assuming X1 and X2 remain constant.

F test

Table 5. Simultaneous F Test (ANOVA)

Model		*Sum of Square*	*ff*	*Mean Square*	F	*Sig.*
11	*Regression*	390673801285,477	3	130224600428,492	42,997	,000[b]
	Residuals	24229453888,773	8	3028681736,097		
	Total	414903255174,250	11			

Source: SPSS Processed Data

Based on the ANOVA table presented earlier, the calculated F value is 42.997 and the significance level denoted by Sig. is 0.000b, which is below the 5% threshold. In addition, the Sig. value of 0.000 is smaller than 0.05. The F table value, with (df1) equal to 3 (representing the number of independent variables, k) and df2 equal to 8 (n-k-1), is 4.07. Comparing the calculated F of 42.997 with the F table value of 4.07, it is clear that H0 should be rejected in favor of H1. This means that the independent variables of Indonesian tuna production volume, exchange rate, and export price have a significant and simultaneous effect on Indonesian tuna exports to the United States.

Test t

Table 6. The t-test

Variables	t Count	t Table	Sig.
(X_1) Indonesian Tuna Production Volume	-,394	2,306	,704
(X_2) Exchange Rate (Kurs)	-7,286	2,306	,000
(X_3) Tuna Export Price	-3,488	2,306	,008

Source: SPSS Processed Data

Based on this table, regarding the hypothesis of the t test results obtained, namely:

A. Variables of Indonesian Tuna Fish Production Volume on Indonesian Tuna Fish Exports to the United States

The t value has been calculated to be -0.394 based on the initial calculation. To get the t table value, (df) 8 (n-k-1) is used with a significance level of $\alpha/2 = 0.025$. After the calculation, the t value of -0.394 is obtained which is lower than the t table value of 2.306. Therefore, it is evident that the null hypothesis (H0) is accepted and the alternative hypothesis (H1) is rejected. Furthermore, the significance value (Sig.) recorded at 0.704 is greater than the threshold of 0.05.

After conducting the t-test, it has been determined that the Indonesian tuna production volume variable is within the H0 acceptance area. The following reveals that there is a partially insignificant effect of the volume variable on Indonesian tuna exports to the United States.

B. Exchange Rate (Kurs) Variables on Indonesian Tuna Exports to the United States

After performing an incomplete calculation, it was found that the t value was equal to -7.286. When consulting the t table with 8 degrees of freedom (nk-1) and an alpha level of 0.025, the table value is determined to be 2.306. Therefore, since the calculated t of -7.286 is higher than the t table of 2.306, the null hypothesis is rejected and the alternative hypothesis is accepted. The calculated significance value of 0.000 is less than the standardized significance level of 0.05.

Based on the t-test results, the null hypothesis (H0) has been rejected. The following reveals that the exchange rate variable plays an important role on Indonesian tuna exports to the United States. Specifically, it shows that the exchange rate has a significant impact on these exports.

C. Tuna Fish Export Price Variables on Indonesian Tuna Fish Exports to the United States

After preliminary calculations, it was determined that the t value was -3.488. The t table value ($\alpha/2 = 0.025$) for a degree of freedom (df) of 8 (nk-1) shows a t table value of 2.306. Therefore, since the calculated t value of -3.488 exceeds the t table value of 2.306, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. Furthermore, with a Sig. value of 0.008 <0.05, the results are statistically significant.

The t-test results show that the null hypothesis (H0) is rejected, indicating a significant effect of the export price variable on Indonesian tuna exports to the United States. In simpler terms, the price of exported tuna has an important influence on the amount of tuna exported to the US.

Discussion

As for the results of the tests that have been held in order to get the best results in the following research, the effect of each independent variable, namely the volume of Indonesian tuna fish production, the exchange rate (exchange rate), and the export price of tuna fish on Indonesian tuna fish exports to the United States is described in the discussion below**:**

Analysis of the Effect of Indonesian Tuna Fish Production Volume on Indonesian Tuna Fish Exports to the United States

Based on the results of the partial hypothesis test, it can be concluded that statistically there is no significant effect between the variables of Indonesian tuna production volume on Indonesian tuna exports to the United States. The t value of -0.394 < t table 2.306 and the Sig. 0.704 > 0.05 indicates this. This finding contradicts the original hypothesis that fluctuations in Indonesian tuna production would negatively impact Indonesian tuna exports to the US. However, it should be noted that the challenges posed by tariff and non-tariff barriers play an important role in this result. Tariff barriers result in significant economic losses for Indonesia as an exporting country, while non-tariff barriers include issues such as export licensing, health certification, sanitary standards, quality standards, environmental concerns, human rights issues, and terrorism. In addition, demand factors had a sizable impact on Indonesian fresh tuna in almost every period.

The following research contradicts the results (Rahmat Rifaldi, Zulkarnain, 2020) has the title "Analysis of Factors Affecting the Volume of Indonesian Tuna Fish Exports", revealing that "the variable amount of domestic tuna fish production has a positive and real influence on the volume of Indonesian tuna fish exports". As well as research conducted (Sunarya, 2018) with the title "Factors Affecting the Export Value of Indonesian Fresh Tuna Fish to the United States", states that "Indonesian tuna fish production has a significant negative effect on fresh tuna fish exports to the United States".

Analysis of the Effect of Exchange Rates (Kurs) on Indonesian Tuna Fish Exports to the United States

The effect of exchange rate variables on Indonesian tuna exports to the United States was tested through partial hypothesis testing. The research results reveal that the calculated t value is -7.286 > t table 2.306 and the Sig value. 0,000 < 0,05. This finding contradicts the previous hypothesis and states that the exchange rate variable has a significant impact on Indonesian tuna exports to

the United States. In addition, the negative coefficient implies that there is an opposite relationship between the exchange rate and Indonesian tuna exports to the United States. Specifically, an increase in the exchange rate leads to a decrease in Indonesian tuna exports to the United States.

"Exchange rates are key for a country in the implementation of international trade. Depreciation or weakening of the rupiah will boost exports. Because, on the international market Indonesian products are seen to be cheaper which results in the "*demand" for* Indonesian tuna exports to the United States experiencing a surge and vice versa."

The following research is in line with research (Latuheru, 2022) with the title "The Effect of Exchange Rates on the Volume of Fresh Fish Exports from Indonesia to Singapore", revealed that "between volume and exchange rates have a significant negative effect and the volume of exports is influenced by the exchange rate, if the exchange rate decreases, the export volume will increase, and vice versa".

Analysis of the Effect of Tuna Fish Export Prices on Indonesian Tuna Fish Exports to the United States

The partial hypothesis test results reveal that the tuna export price variable has an influence on Indonesian tuna exports to the United States. Specifically, the calculated t value of -3.488 > t table 2.306 and the Sig value. 0.008 < 0.05 which supports the initial hypothesis. This means that if the export price of tuna fluctuates, it will have a significant and negative effect on Indonesian tuna exports to the United States. If the export price drops, the export volume will increase, and vice versa.

The following research is in line with research (Rahmat Rifaldi, Zulkarnain, 2020) entitled "Analysis of Factors Affecting the Volume of Indonesian Tuna Fish Exports ", revealed that "the export price of tuna fish has a significant negative effect on the volume of Indonesian tuna fish exports". The following is due to competition in the international price of tuna fish in the world market which is increasingly competitive." As well as research (Sunarya, 2018) entitled "A number of factors that influence the value of Indonesian Fresh Tuna Fish Exports to the United States", states that "Indonesian tuna fish production has a significant negative effect on the export of fresh tuna fish to the United States"

4. Conclusions

In conclusion, this study reveals that Indonesian tuna exports to the United States are significantly influenced by various factors, including tuna production volume, exchange rates, and export prices. These factors collectively exert a substantial impact on the Indonesian tuna export industry. Interestingly, the tuna production volume has shown limited influence on exports due to the formidable tariff and non-tariff barriers faced by tuna products. Notably, fluctuations in the exchange rate play a pivotal role in shaping Indonesia's tuna exports to the United States. A depreciating rupiah encourages exports, making Indonesian products more affordable globally, thereby boosting demand. Conversely, a stronger rupiah has the opposite effect.

Furthermore, the study underscores the detrimental impact of export costs on Indonesia's tuna exports to the United States, particularly intensified global market

competition in tuna prices. This finding highlights the challenges faced by the industry in maintaining competitiveness.

In light of these conclusions, it is recommended that the Indonesian government intervenes to support the tuna processing business by addressing tariff and non-tariff policy challenges. Collaboration between exporters and the government is crucial to overcoming these issues and ensuring the sustainability of the industry. Additionally, maintaining exchange rate stability is paramount for encouraging trade activities, enhancing trust with other countries, and fostering cooperative relationships. To increase the value of tuna exports, efforts should be directed toward improving the competitiveness of Indonesian tuna products through value addition and fostering the growth of the domestic fish processing sector. Government policies and support for the development of the tuna processing industry are essential in achieving these objectives, ultimately contributing to increased foreign exchange earnings.

However, it is essential to acknowledge the limitations of this study, such as the focus on a specific time frame (2010-2021) and the exclusion of certain relevant factors. For future research, an exploration of a broader time range and the inclusion of additional variables could provide a more comprehensive understanding of the dynamics influencing Indonesian tuna exports. Additionally, investigating consumer preferences and market trends could offer valuable insights for devising more effective strategies to navigate the challenges faced by the industry.

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