# Determining the Trade Value of Indonesian Lobster Exports to Destination Countries in 2018–2023

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***Abstract:***

*Indonesia has a very wide water area, making it one of the countries with great potential in developing the fisheries industry, especially in leading commodities such as lobster. This study was conducted to examine various factors that impact the value of Indonesian lobster exports to six major trading partner countries, namely China, Hong Kong, Japan, Singapore, Malaysia, and South Korea throughout 2018 to 2023. This study uses several independent variables including lobster prices, consumption tastes (Ratio), GDP per capita of destination countries, export value (FOB), export quantity, and economic distance. This study uses a quantitative approach by utilizing secondary data in the form of panel data, consisting of a time series from 2018 to 2023 and cross-country data for six export destination countries. Information was obtained from official sources such as BPS, Trade Economic, World Bank, and the Ministry of Marine Affairs and Fisheries (KKP). Based on the results of the analysis, the Common Effect Model (CEM) approach was identified as the most appropriate model in this study compared to other approaches. The results of the F test show that all independent variables have a significant influence on the value of Indonesian lobster exports, both simultaneously and partially. The determination value (R²) of 65.94% indicates that the regression model is able to explain most of the variation in the value of lobster export trade. The results of this study play a significant role in supporting the formulation of policies to increase the competitiveness of Indonesian fishery exports in the international market.*

## 1. Introduction

Indonesia is the largest archipelago in the world, with a total area of approximately 1,904,569 km² (Adiyanto, 2020). Globally, Indonesia ranks sixth in terms of the number of islands, with approximately 17,504. Its territory stretches between two large oceans, the Indian Ocean and the Pacific Ocean, providing a unique geographical advantage. This position makes Indonesia a vital connecting route between the Asian

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continent to the north and the Australian continent to the south (Sutinah et al., 2024). This strategic location makes Indonesia not only rich in marine biodiversity but also a major route for international trade, particularly in the maritime and fisheries sectors.

This potential can create opportunities for the development of maritime-based economic sectors, particularly by optimizing marine products such as fish, seaweed, and high-value commodities like lobster. According to Rizkillah (2021), lobster is a leading commodity in the fisheries sector due to its significant economic value and promising export potential in the international market. International demand for lobster continues to increase in line with the growing trend of high-end seafood consumption in various countries. Therefore, lobster is one of Indonesia's leading export products, holding a strategic position in the international market.
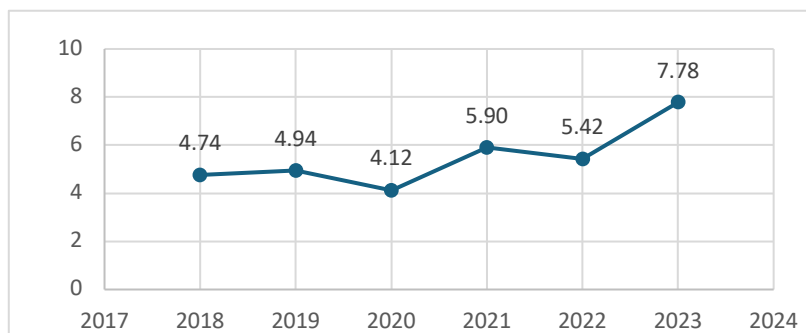


**Figure 1. Global Lobster Demand 2018-2023.**
**Source: Ministry of Maritime Affairs and Fisheries, 2023**

Figure 1 shows that global lobster demand tends to increase from 2018 to 2023. A decline occurred in 2020 of US$4.12 billion, and demand rose significantly again to US$5.90 billion in 2021, reaching a peak of US$7.78 billion in 2023. This increase indicates growing global market interest in fishery commodities, particularly lobster, which is increasingly popular as global consumers increasingly consume premium seafood in various countries. This finding aligns with a study by Boesono et al., (2011), which found that global demand for lobster commodities shows a consistent upward trend from year to year. This phenomenon indicates that lobster plays a significant role in supporting the national economy, as seen from its high sales value and substantial export potential. However, the high demand for lobster also poses a challenge for Indonesia in increasing its contribution to meeting global market needs (Susanti et al., 2017).

In supporting economic activity, international trade serves as a key pillar in driving economic relations between countries. International trade is a form of economic cooperation between countries aimed at creating mutual benefits, particularly in meeting domestic needs that cannot be optimally met through domestic production (Purba et al., 2023) As a developing country, Indonesia utilizes exports as a key driver of economic growth.

Exports are a form of trade activity between countries that plays a vital role in driving the dynamics of international trade growth (Benny, 2013). According to Puspasari & Darmawan (2017) export activities can also encourage increased employment opportunities, community income, and the growth of supporting sectors such as transportation, logistics, and the processing industry. Thus, export activities play a strategic role in supporting long-term economic growth and improving social welfare. The fisheries sector is a major contributor to exports, particularly through high-value commodities such as lobster, which continue to experience increasing demand in the international market.

**Figure 2. Value and volume of Indonesian lobster exports from 2018 to 2023.**
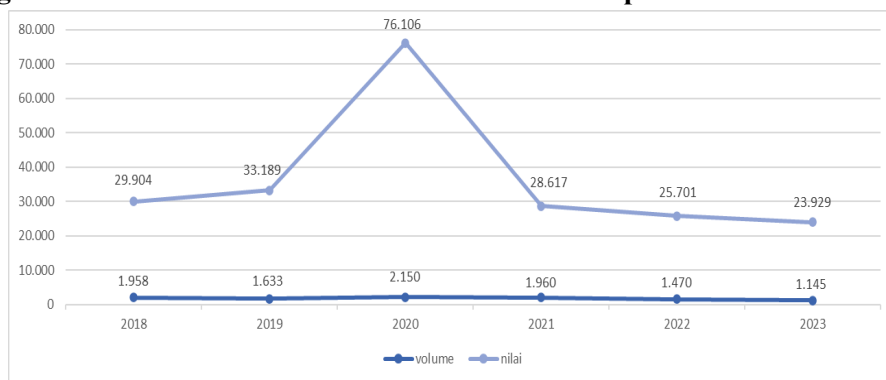


**Source: Ministry of Maritime Affairs and Fisheries, 2024.**

Figure 2 shows a sharp increase in the value and volume of Indonesian lobster exports in 2020, reaching USD 76.106 million, despite export volume only reaching 2,150 tons. This reflects the high demand and price of lobster on the international market at that time. However, in 2021, the value of lobster exports declined to USD 28.627 million and continued to decline to USD 23.929 million by 2023. Volume also decreased from 1,960 tons to 1,145 tons. Research by Saria (2022) revealed that the decline in Indonesian lobster exports since 2021 is likely due to the implementation of regulations on the export of clear lobster seeds (BBL) as stipulated in the Minister of Maritime Affairs and Fisheries Regulation Number 17 of 2021. Although aimed at preserving lobster populations, this has resulted in a decline in export volume and value.

In the context of Indonesian lobster exports, several variables are suspected of influencing the value of export trade, such as lobster prices on the international market, public consumption levels, GDP per capita of destination countries, the total value of Indonesian exports to destination countries, quantity, and the economic distance between Indonesia and the export destination countries. The destination countries focused on in this study are China, Hong Kong, Japan, Singapore, Malaysia, and South Korea, which are the main markets for Indonesian lobster exports. Each

country has different market characteristics, making it important to analyze the influence of these variables in greater depth.

Several studies have examined Indonesian lobster exports from different perspectives. Maskun et al. (2020) analyzed the legal aspects of lobster export policies within a sustainable development framework, but did not explore quantitative trade determinants such as international market prices or GDP per capita of destination countries. Gea et al. (2023) investigated competitiveness and the impact of government policy, yet their scope was limited to policy and RCA indicators without integrating broader macroeconomic variables or cross-country market characteristics. Rossa et al. (2021) focused on market failures in the context of seed lobster exports, highlighting institutional and regulatory shortcomings but leaving the economic measurement of trade value largely unexplored. Adiputra et al. (2024) addressed policy challenges and smuggling dynamics in puerulus exploitation, providing critical insight into governance issues but not linking these to variations in trade value among different destination countries. Meanwhile, Kumar and Patil (2022) explored global seafood consumer behavior and substitution patterns, which offers useful context for demand-side analysis, yet their work did not specifically address the Indonesian lobster sector.

This indicates a research gap in integrating multiple economic, market, and geographic variables—such as lobster prices in the international market, public consumption levels, GDP per capita of destination countries, total Indonesian export value, export quantity, and economic distance—into a single empirical model to assess their influence on the trade value of Indonesian lobster exports across multiple major destination countries with distinct market characteristics.

This research is expected to provide a deeper understanding of the various factors influencing Indonesia's lobster export performance. The results of this study can then be used as a reference in formulating strategic policies to increase competitiveness in the global market while ensuring the sustainability of the national fisheries sector.

## 2. Theoretical Background

**Comparative Advantage Theory:** The theory of comparative advantage, introduced by David Ricardo, states that a country benefits from international trade by specializing in the production and export of goods that it can produce at a relatively lower opportunity cost than other countries. The focus of this theory is on relative, not absolute, efficiency. Thus, even if a country is capable of producing all goods more efficiently, it will still benefit from concentrating on goods where its comparative efficiency is the highest (Ricardo, 1821; Salvatore, 2019). In this context, Indonesia has a comparative advantage in lobster production due to its vast marine resources, abundant natural capital, and lower labor costs. Utilizing this advantage allows Indonesia to compete effectively in the global lobster market. Sutinah et al. (2025) explain that a country will benefit the most by exporting goods that it can produce more cheaply, thus optimizing trade. Similarly, Azmi et al. (2024) emphasize that

specialization and international trade increase the efficiency of resource allocation and contribute to national income. Therefore, the export of lobsters as a leading commodity illustrates the practical application of comparative advantage theory in strengthening Indonesia's trade position.

**Gravity Model of Trade:** The gravity model of trade suggests that the volume of trade between two countries is positively influenced by the size of their economies (measured by GDP or per capita income) and negatively affected by the geographical distance between them. The larger the economic size and the shorter the distance, the greater the trade potential (Krugman, 2008). In the case of Indonesia's lobster exports, this model explains why neighboring countries such as Singapore and Malaysia are key markets—they offer high purchasing power and low logistical costs due to geographic proximity. Nationally, Tambunan (2012) highlights that logistics and infrastructure are crucial factors in the success of exports, especially for time-sensitive commodities like seafood. Muzayyin et al. (2019) add that regional economic integration depends heavily on transport efficiency and market accessibility. Thus, the gravity model is highly relevant in evaluating trade flows and export potential for Indonesia's lobster, particularly in relation to destination countries' economic capacity and distance.

**Export Demand Theory:** Export demand theory posits that a country's exports are influenced by several factors, including product prices, income levels in the importing countries, and consumer preferences. Higher per capita income in a destination country typically increases demand for premium commodities like seafood (Carbaugh, 2016). Moreover, cultural preferences also significantly shape market demand. East Asian countries such as Japan, South Korea, and China show consistent demand for seafood due to its deep-rooted place in their food culture. In Indonesia, Maghfirah (2024) explains that consumer demand is shaped by preferences, income, and substitution effects. Oppier et al. (2021) reinforce that international demand is largely affected by the purchasing power and tastes of foreign consumers. Therefore, a thorough understanding of consumer behavior in destination countries is critical in determining the direction and strength of lobster exports from Indonesia. This theory helps form the basis of demand-side strategies in global trade.

**Supply and Demand Theory:** The law of supply and demand states that the price of a product is determined by the interaction between its availability (supply) and consumer needs (demand). If demand increases while supply remains constant, prices will rise, positively impacting export value (Metzgar, 2023). This theory is highly relevant in the context of lobster, a product with relatively inelastic short-term supply and high sensitivity to demand fluctuations in global markets. From a national perspective, Saria (2022) emphasizes that the instability of commodity prices, including exports, is closely tied to supply-demand dynamics. Siregar et al. (2020) further argue that external factors such as weather conditions, production technologies, and harvesting regulations also influence supply levels. Thus, understanding this theory is crucial in predicting price trends, planning production, and managing the sustainability of Indonesia's lobster export industry.

## 3. Methodology

This research adopts a quantitative methodology, employing both descriptive and inferential techniques to systematically and numerically examine the impact of economic variables on Indonesia's lobster export trade value. The study utilizes secondary panel data, integrating time series data from 2018 to 2023 with cross-sectional data from six key export destinations: China, Hong Kong, Japan, Singapore, Malaysia, and South Korea. All datasets were sourced from authoritative institutions, including Statistics Indonesia (BPS), Trade Economics, the World Bank, and the Ministry of Maritime Affairs and Fisheries (KKP).

The research focuses on one dependent variable the export trade value of Indonesian lobsters (measured in thousands of USD) and six independent variables: global lobster prices (USD per kilogram), consumer preferences (measured by consumption ratios in importing countries), GDP per capita of the destination nations (in USD), export value based on Free On Board (FOB) pricing, export volume (in tons), and economic distance (USD per kilometer). To estimate the effect of these variables, panel data regression was employed through three models: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM).

Model selection was conducted using the Chow test (to compare CEM and FEM) and the Hausman test (to differentiate between FEM and REM). Subsequently, an F-test was used to evaluate the joint significance of all independent variables, while t-tests were applied to assess the significance of each predictor individually. The coefficient of determination ($R^2$) was calculated to determine the explanatory power of the independent variables on the variation in export values. Data processing and analysis were carried out using Stata software, recognized for its strong capabilities in handling panel data, conducting model selection, and performing comprehensive regression diagnostics.

## 4. Empirical Findings/Result

The estimation of panel data regression results using three approaches, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) based on cross-section and time series data is presented as follows:

**Table 1. Panel Data Regression Results**

| Variabel | CEM | FEM | REM |
|---|---|---|---|
| c | -603985 | -3517756 | -603985 |
| price | 146.3 | 94.8364 | 146.3 |
| ratio | -189685.3 | -135675.6 | -189685.3 |
| GDP per capita | 46.23247 | 126.4192 | 46.23247 |
| FOB | 10592.58 | 9525.572 | 10592.58 |
| Qty | 12.3791 | 10.2954 | 12.3791 |
| ED | -0.0027 | -0.0033 | -0.0027 |
| R2 | 0.6594 | 0.6331 | 65.94 |
| F-statistic | 9.36 | 6.90 | 56.14 |

| Prob. F-statistic | 0.0000 | 0.0002 | 0.000 |

Source: panel data output results processed using STATA.

**Best Model Estimation Selection Test**
The selection of the most appropriate panel data model between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) is carried out using the Chow Test and the Hausman Test to obtain the most accurate estimation results.

**Chow Test**
The results of the Chow test are presented in Table 2 below:

**Table 2. Chow Test Results**

| Test Name | Prob>F |
|---|---|
| Chow Test | 0.2514 |

Source : panel data output using STATA (2025)

The Chow test results shown in Table 2 show a probability value of 0.2514. This value exceeds the 1% significance level ( $\alpha = 0.01$), so there is insufficient evidence to reject the null hypothesis . Thus , the Common Effect model considered more in accordance compared to the Fixed Effect model based on the results of this.

**Lagrange Multiplier Test**
Based on results model comparison in testing previously , it is necessary testing advanced use Lagrange Multiplier (LM Test) for determine a more precise model appropriate between Common Effect and Random Effect . A summary of the results of the Lagrange Multiplier test can be seen in the following table:

**Table 3. Lagrange Multiplier Test Results**

| Chibar2 | 0.0000 |
|---|---|
| Prob>chibar2 | 1,0000 |

Source : panel data output using STATA (2025)

Lagrange Multiplier test yields a probability value of 1.0000, which is higher than the 1% significance level ( $\alpha = 0.01$). Therefore, the Common Effect model is considered more suitable for use in panel data regression.

Based on the overall model testing results, using both the Chow and Hausman tests, the Common Effects (CEM) model was determined to be the best model. The regression estimation results using this model are presented as follows:

**Table 4. Estimation Results Common Effect Model**

$$(NP)_{it} = -063985 + 146.3(Harga)_{it} - 189685.3(Rasio)_{it}$$
$$(0.614) \quad (0.099)^* \quad (0.020)^*$$
$$+ 46.2324(GDP\ perkapita)_{it} + 10592.8(FOB)_{it}$$
$$(0.031)^* \quad (0.007)^*$$
$$+ 12.3791\ (QTY)_{it} - 0.0027(ED)_{it}$$
$$(0.000)^* \quad (0.008)^*$$

$R^2 = 0.6594$; Adj. $R^2 = 0.5889$; F-stat = 9.36; Prob. F-stat = 0.0000

Source : panel data output using STATA (2025)

Note: *Significance at α = 0.01; **Significance at α = 0.05; ***Significance at α = 0.10. The numbers in parentheses are the probability values of the t-statistics.

Based on the regression estimation table, it is obtained that the Price variable has a coefficient of 146.3 with a significance level (p-value) of 0.099, indicating a statistically significant effect at the 10% significance level. The Consumption Taste (Ratio) variable has a negative effect with a coefficient value of -189,685.3 and a p-value of 0.020, which means it is significant at the 5% level. Furthermore, the GDP per capita variable shows a positive effect on the dependent variable with a coefficient of 46.2324 and a p-value of 0.031. The export value (FOB) also has a significant effect with a coefficient of 10,592.8 and a p-value of 0.007. The Quantity (QTY) variable shows a very significant positive effect, with a coefficient of 12.3791 and a p-value of 0.000. Meanwhile, Economic Distance (ED) has a negative effect on the export value with a coefficient of -0.0027 and a p-value of 0.008. Overall, the regression model has an R-Squared value of 0.6594, equivalent to 65.94%, meaning the model is able to explain 65.94% of the variation in the data. The simultaneous significance test (F-Statistic) shows a value of 9.36 with a probability of 0.0000, indicating that all independent variables together have a significant effect on the dependent variable.

**Model Goodness -of-Fit Test**
**Model Existence Test (F Test)**
Based on the F-test results, the obtained significance level of 0.0000 is lower than the 1% threshold (α = 0.01), leading to the rejection of the null hypothesis (H₀). This implies that the regression model is statistically valid and can be used for analysis. Therefore, it can be inferred that the independent variables price, consumption preference (ratio), GDP per capita, export value (FOB), export quantity (QTY), and economic distance (ED) collectively exert a significant influence on the lobster export trade value. Meanwhile, the coefficient of determination ($R^2$) value of 0.6594 suggests that 65.94% of the variation in the dependent variable is explained by these six predictors, while the remaining 34.06% is attributed to factors beyond the scope of this model.

**Table 5. Results of the Validity Test of the Influence of Independent Variables**

| Variables | Sig.t | Criteria | Conclusion |
|---|---|---|---|
| Price | 0.099 | < 0.01 | have a significant impact |
| Ratio | 0.020 | < 0.01 | have a significant impact |
| GDP per capita | 0.031 | < 0.01 | significant influence |
| FOB | 0.007 | < 0.01 | significant influence |
| QTY | 0.000 | < 0.01 | have a significant impact |
| ED | 0.008 | < 0.01 | have a significant impact |

Source : panel data output results processed using STATA .

Results of the t-test on the regression model show that all over variables independent, namely price , taste consumption ( ratio ), GDP per capita , value export (FOB), export volume (QTY), and distance economics (ED), has significant influence in a way simultaneous to variables dependent , namely mark trading Lobster exports . These

findings indicate that each variable individually contributes to explaining fluctuations in the value of Indonesian lobster trade.

**Interpretation of the Influence of Independent Variables**
Based on the results of the validity test of the influence (t-test) on the model used, it was found that all independent variables, namely price, consumption taste (ratio), Gross Domestic Product (GDP) per capita, export value (FOB), quantity (QTY), and economic distance (ED), had a significant influence on the dependent variable, namely the value of lobster export trade.

The regression coefficient for the price variable, 146.3, indicates a positive linear relationship between price and trade value. Therefore, every 1% increase in price will increase the value of lobster export trade by 146.3%. Conversely, a 1% decrease in price will decrease trade value by the same amount.

Meanwhile, the consumption appetite variable has a regression coefficient of -189,685.3, indicating a negative linear relationship. This means that a 1% increase in the consumption ratio will actually decrease the trade value by 189,685.3. Conversely, a 1% decrease in consumption appetite will increase the trade value by the same amount.

GDP per capita shows a regression coefficient of 46.2324, which indicates that every 1% increase in GDP per capita of the destination country will have an impact on increasing the value of lobster trade by 46.2324, and vice versa.
Export value (FOB) also had a positive effect, with a regression coefficient of 10,592.8. This means that a 1% increase in export value is directly proportional to a 10,592.8% increase in trade value.

For the quantity variable, the regression coefficient was recorded at 12.3791, indicating that every 1% increase in export quantity has the potential to increase trade value by 12.3791. Conversely, a decrease in export quantity will result in a decrease in trade value by the same amount.

Finally, the economic distance variable has a negative coefficient of -0.0027. This indicates that the greater the economic distance between Indonesia and the export destination country, the trade value will decrease by 0.0027. Conversely, the smaller the economic distance, the potential for trade value to increase by the same amount.

## 5. Discussion

Based on the research findings on the factors influencing the value of Indonesian lobster exports, several policy implications and strategic recommendations can be considered by stakeholders. One key point that warrants attention is the need to review export policies, particularly those related to the export restrictions on lobster larvae (BBL). While this policy aims to preserve biological resources, its approach needs to be optimized to avoid hampering national export performance, particularly in terms

of the value and volume of lobster exports, which are a mainstay of the fisheries sector (Saria, 2022; Rossa et al., 2021).

Furthermore, strengthening regulations that support legal, environmentally friendly, and sustainable lobster cultivation practices is urgently needed. This step must be accompanied by increased oversight of illegal lobster fishing and export activities, which remain a challenge in the governance of the fisheries sector (Rizkillah, 2021). Such efforts are crucial for creating a fair business climate and ensuring the long-term sustainability of Indonesia's marine ecosystems (Salvatore, 2019).

The government is also expected to expand support to business actors by improving access to export markets and building adequate supporting infrastructure. The availability of efficient logistics facilities, integrated export ports, and a distribution system that supports time and cost efficiency will significantly contribute to increasing the competitiveness of Indonesian lobster in the global market (Tambunan, 2012; Puspasari & Darmawan, 2017).

Meanwhile, from the business perspective, increasing efficiency in the production process and maintaining the quality of export products are crucial. From the rearing stage and through processing, to packaging and distribution, the entire value chain needs to be managed professionally (Susanti et al., 2017). Developing more adaptive cultivation technologies and diversifying export markets are also important strategies to ensure Indonesia's ability to penetrate potential non-traditional markets, rather than solely rely on key partner countries (Sutinah et al., 2025).

Finally, adopting economic theories such as comparative advantage (Ricardo, 1821; Purba et al., 2023) and microeconomic principles related to production efficiency (Oppier et al., 2021) can provide a strong conceptual framework for designing export strategies. By leveraging Indonesia's natural advantages in lobster production while addressing structural and policy-related barriers, the country can strengthen its position in the global seafood trade.

## 6. Conclusions

Based on the results of the panel data regression analysis, the most appropriate model for this study was the Common Effects Model (CEM). This model was selected based on the results of a model selection test, which demonstrated that the CEM approach better captured the general relationships between variables in cross-country and time-series data compared to the Fixed Effects and Random Effects models.

Furthermore, the results of a simultaneous model significance test using the F-test indicated that all independent variables used—lobster price, consumption preferences (ratio), Gross Domestic Product (GDP) per capita of destination countries, export value based on FOB, export quantity, and economic distance—collectively had a significant influence on the value of Indonesian lobster exports during the period 2018

to 2023. This confirms that these factors collectively play a significant role in explaining export value movements.

The coefficient of determination ($R^2$) obtained from the analysis model was 0.6594, indicating that approximately 65.94% of the variation in lobster export value can be explained by these six independent variables. Meanwhile, the remaining 34.06% is explained by other factors not included in the model, such as export-import policies, logistical conditions, or other non-economic factors.

A t-test, or partial significance test, found that all independent variables used in this study had a significant and positive influence on lobster export value. This means that increases in lobster prices, consumption growth in destination countries, increases in GDP per capita, increases in export value, increases in export volume, and economic distance all significantly contributed to the increase in the value of Indonesian lobster exports to the six main destination countries.

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