

## Competitiveness Analysis of Indonesian Frozen Shrimp Exports to China Using RCA and EPD

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### ABSTRACT

**Keywords:**

Export; China; EPD; frozen shrimp; RCA;

Indonesia is one of the world's major exporters of frozen shrimp, but its market share in China is still relatively small despite the country's high demand. This study aims to analyze the trend of Indonesia's frozen shrimp export performance to China, analyze comparative competitiveness using Revealed Comparative Advantage (RCA) analysis, analyze competitiveness dynamics through Export Product Dynamic (EPD), and formulate strategies to improve export competitiveness. The study used secondary time series data (2014-2023) obtained from BPS, KKP, UN Comtrade, and other official sources. The results showed that the trend of Indonesia's frozen shrimp exports to China fluctuates but tends to increase, with a significant spike in 2022. The RCA analysis shows that Indonesia's comparative competitiveness was strong at the beginning of the period, but weakened since 2019-2023 as the RCA value is consistently below one. Meanwhile, the EPD analysis shows that Indonesia's export position is often in the Lost Opportunities category, signaling a failure to capitalize on market growth despite growing Chinese demand. These findings indicate the need for strategies to strengthen competitiveness through market diversification, modernization of cultivation systems, improved logistics efficiency, implementation of international standards, and more aggressive promotion and branding in the Chinese market.

### INTRODUCTION

Indonesia is known as a maritime country, the largest archipelago in the world with waters covering three-quarters of its territory. This condition provides Indonesia with abundant marine resources with a potential stock of marine products reaching 12 million tons annually. The fisheries industry has significant potential to drive the national economy. The fisheries sector contributed to Indonesia's GDP in 2021, which was recorded at 2.83% (BPS, 2021). The large potential of marine and fisheries production can significantly support Indonesia's supply, thus encouraging international trade.

Shrimp is the fisheries subsector that drives the growth of the country's marine economy. This is due to its large resource potential, high selling value, and excellent market opportunities. Shrimp dominated Indonesia's total marine exports from 2019 to 2023, with the highest export value in 2021 reaching US\$ 2.22 billion (KKP, 2023). This proves that shrimp is Indonesia's main product in the international seafood market, compared to other fisheries.

External factors that hinder the export of domestic shrimp products include various requirements imposed by customers or buyers to ensure exported shrimp products are free of viruses and antibiotics (Wahyudi *et al.*, 2019). Non-tariff barriers applied in major markets cause Indonesian shrimp exports to be less competitive than other competing countries (Permatasari, 2019) [8]. The buyer's regulatory requirements are not only scientifically based but are often a buyer's strategy to reduce the purchase price of shrimp (price locking strategy).

The United States, Japan, China, the Netherlands, Malaysia, Thailand, the United Kingdom, and Singapore are the destination countries for Indonesia to export shrimp with a share of more than 90% (Kusuma *et al.*, 2021). The following Harmonized System (HS) codes are used for globally traded shrimp products, namely 030617 for frozen shrimp, 030636 for fresh shrimp, and 030695 for processed shrimp. UN Comtrade data (2024) shows that Indonesia is the third ranked frozen shrimp exporter in the world with a value of US\$ 1.08 billion and an export volume of 134.989.531 kg in 2024, behind Ecuador and India.

Table 1. Frozen Shrimp Export of Some Countries to the World by Year

Negara Eksportir	Nilai (US\$)	Net Weight (kg)
Ecuador	6.233.921.804	1.084.072.791
India	4.312.615.581	666.397.350
<b>Indonesia</b>	<b>1.080.182.156</b>	<b>134.989.531</b>
Argentina	939.025.295	146.688.517
Thailand	540.628.198	56.259.814
China	382.333.338	49.910.828
Spain	366.164.523	42.459.401
Netherlands	338.298.868	40.343.481
Total	14.193.169.763	2.221.121.713

As one of the major exporters of frozen shrimp, Indonesia has yet to fully capitalize on its potential, despite being in the top position. China was previously the world's largest shrimp producer, with total imports reaching around 400 million kilograms. However, only 2% of Indonesian products are exported to China, so there is a great opportunity for shrimp products to increase market share there (KKP, 2018).

Thus, this study aims to: (1) analyze trends in Indonesia's frozen shrimp exports to China; (2) analyze comparative competitiveness using *Revealed Comparative Advantage* (RCA) analysis; (3) analyze competitiveness dynamics through *Export Product Dynamic* (EPD); and (4) formulate strategies to strengthen the competitiveness of Indonesian shrimp in the Chinese market.

## METHOD

This research was conducted from November 2024 to February 2025. This research utilizes secondary data in the form of time series for ten years, starting from 2014 to 2023. Secondary data is data obtained from official agencies or organizations related to the research. In this study, data was collected from BPS, KKP, World Bank, and UN Comtrade. This research conducted data collection techniques through literature approach and document analysis.

### *Revealed Comparative Advantage (RCA)*

The basic principle is that trade between regions indicates the comparative advantage of the region concerned. RCA is defined as a situation where the share of Indonesian shrimp commodity exports in a country's total exports is higher than the share of shrimp commodity export markets in total world exports, indicating a comparative advantage in shrimp production and exports. When the RCA value is greater than one, it indicates that the country has a comparative advantage in shrimp, meaning the commodity is highly competitive. When the RCA value is below one, it means that the comparative advantage for shrimp is not strong enough and indicates low competitiveness.

In this study, RCA was used to determine the competitive position of Indonesian shrimp in the global market. The mathematical RCA formula is as follows:

$$RCA = \frac{X_{ij}/X_j}{W_{ij}/W_j}$$

Description:

- $X_{ij}$  : Export value of Indonesian frozen shrimp to destination country (US\$)  
 $X_j$  : Total value of Indonesian exports to destination countries destination (US\$)  
 $W_{ij}$  : Value of world frozen shrimp exports to destination countries destination (US\$)  
 $W_j$  : Total value of world exports to destination countries (US\$)  
 $i$  : Commodity (frozen shrimp)  
 $j$  : Country

### Export Product Dynamic (EPD)

Export Product Dynamics is an indicator that serves to assess the market position of a particular commodity in a particular country with a targeted market segment. With the EPD method, we can measure the competitive advantage of a product more precisely.

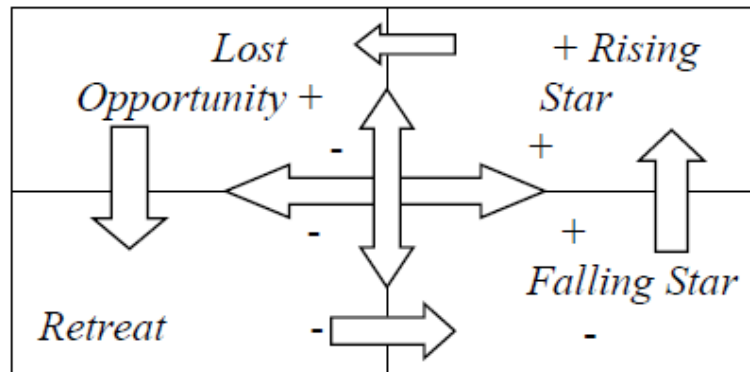


Figure 1. EPD Market Attractiveness and Business Strength Matrix

Quadrant I indicates a *Rising Star* position, which means that the product has developed into an active or dynamic product in the competitive market. Quadrant II indicates a *Lost opportunity*, which means that a country has lost the opportunity to increase the product's market share in the destination country (a situation that should be avoided). Quadrant III indicates a *Retreat* position, which means that products from a country are no longer attractive to the destination market. Meanwhile, Quadrant IV depicts the *Falling Star* position, which means that a country's market share in the destination country is increasing or is competitive, but it does not apply to a product.

The business strength/market share (X axis) of a product can be calculated mathematically in the following way (Furqon, 2021):

$$X\text{-axis} = \frac{\sum_{t-1}^t \left(\frac{x_{ij}}{w_{ij}}\right)_t \times 100\% - \sum_{t-1}^t \left(\frac{x_{ij}}{w_{ij}}\right)_{t-1} \times 100\%}{T}$$

Growth of the product's market share attractiveness (Y-axis):

$$Y\text{-axis} = \frac{\sum_{t-1}^t \left(\frac{x_j}{w_j}\right)_t \times 100\% - \sum_{t-1}^t \left(\frac{x_j}{w_j}\right)_{t-1} \times 100\%}{T}$$

Description:

- $X_{ij}$  = Value of Indonesian frozen shrimp exports to destination country (US\$)  
 $W_{ij}$  = World export value of frozen shrimp to destination countries (US\$) destination (US\$)  
 $X_j$  = Total value of Indonesian exports to destination countries (US\$) destination (US\$)  
 $W_j$  = Total value of world exports to destination countries (US\$)  
 $t$  = Year  $t$   
 $t-1$  = Previous year  
 $T$  = Number of years of analysis

## RESULT AND DISCUSSION

### Trends in Indonesian Frozen Shrimp Exports

Indonesia exports shrimp in three forms, namely *frozen*, *fresh*, and processed. However, only two types of shrimp contributed a significant portion of the export value, namely frozen shrimp (77.38%) and processed shrimp (21.91%) (Furqon, 2021).

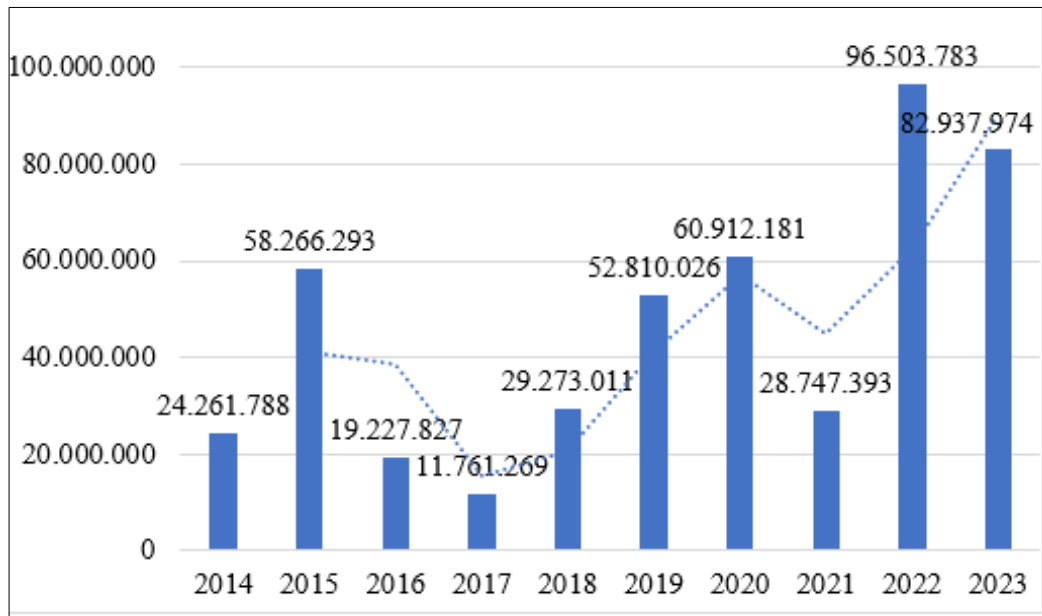


Figure 2. Graph of Indonesia's Frozen Shrimp Export Value in China

Although exports to this market have not always been stable, they have generally shown a positive growth trend over the past three years. This shows the significant potential of the Chinese market as a strategic trading partner for Indonesia's frozen shrimp exports. Therefore, this strong market growth is expected to strengthen Indonesia's exports to China. The geographical proximity of Indonesia and China can provide logistical advantages, as transportation costs are lower than exports to the US market. This implies that Indonesia can improve its efficiency and price competitiveness in the Chinese market if it can manage its supply chain effectively.

Based on the graphical data of the value of Indonesia's frozen shrimp exports to China from 2014 to 2023, it can be seen that export performance fluctuates quite significantly, but shows a long-term upward trend. At the beginning of the period, in 2014, the export value reached \$24.26 million, which increased sharply to \$58.26 million in 2015. However, in 2016 and 2017, there was a drastic decline, reaching only \$19.23 million and \$11.76 million, indicating market disruptions or challenges during the period. Export values then began to gradually increase from 2018 to 2020, with a positive increase from \$29.27 million to \$60.91 million. Although it fell again in 2021 to \$28.74 million, exports increased sharply in 2022, peaking at \$96.50 million before declining slightly in 2023 to \$82.94 million.

The implications of this trend suggest that, although the Chinese market is characterized by volatile annual dynamics, Indonesia as a whole has significant potential to strengthen its export position. The significant growth in 2022 suggests that, with supporting factors such as product quality, competitive pricing, and appropriate export policies, export performance can improve dramatically. Therefore, it is important for the government and businesses to identify the causes of the decline in each year and adjust strategies to ensure more stable and sustainable exports in the long run. Furthermore, to gain a more complete picture of Indonesia's position in the global shrimp trade, a more detailed analysis of competitiveness indicators is needed, including comparative advantage and export dynamics to key markets, including China.

### Competitiveness of Indonesian Frozen Shrimp Exports (RCA)

Competitiveness analysis using the *Revealed Comparative Advantage* (RCA) method illustrates the export performance of Indonesian frozen shrimp by comparing the share of Indonesian frozen shrimp with the share of global frozen shrimp exports to China. In this study, the RCA method measures the comparative competitiveness of Indonesian frozen shrimp in the Chinese market. Indonesian frozen shrimp can be said to be competitive if the RCA value is greater than one ( $>1$ ). Conversely, if the RCA value is less than one ( $<1$ ), Indonesian frozen shrimp is not competitive.

Table 2 Value of RCA Calculation Results of Indonesian Frozen Shrimp Year 2014-2023

Year	RCA Value	Status
2014	8.74	Superior
2015	14.75	Superior
2016	4.08	Superior
2017	1.98	Superior
2018	1.69	Superior
2019	0.76	Not Superior
2020	1.02	Superior
2021	0.30	Not Superior
2022	0.47	Not Superior
2023	0.44	Not Superior
Average	1	Superior at minimum threshold (fragile)

Indonesian frozen shrimp had high competitiveness (superior) in the Chinese market in 2014-2018 and 2020. The RCA value of Indonesian frozen shrimp in the Chinese market was above 1, with the highest value recorded in 2015 at 14.75, indicating that in that period Indonesia had a strong comparative advantage for this product. However, since 2019 the RCA value has decreased below 1, which indicates a loss of comparative advantage or means that Indonesia no longer has a comparative advantage in frozen shrimp exports in the Chinese market. The average RCA value of Indonesia's frozen shrimp over the 10-year period is approximately equal to 1, suggesting that its comparative advantage lies around the threshold level. This indicates that, on average, Indonesia does not exhibit a strong comparative advantage in frozen shrimp exports. Nevertheless, this finding should be interpreted cautiously, as the RCA indicator in isolation does not reflect temporal variability or relative performance compared to competing exporters.

This phenomenon reflects the reality also found by Furqon (2021), who found that the comparative competitiveness of Indonesia's frozen shrimp is generally strong in key destination countries, including China, but is on a declining trend that requires vigilance. Therefore, Indonesia must make substantial improvements to restore its comparative advantage. These improvements include increasing production efficiency, improving product quality and diversifying export products to meet the needs of Chinese customers.

The implication of the declining RCA is that, despite the nominal increase in export value, Indonesia's comparative advantage over its competitors in the Chinese market continues to weaken. This decline may indicate increased competition from other countries, a decline in domestic production efficiency, or a change in the demand structure of the Chinese market for imported shrimp. The low RCA values in recent years also indicate that Indonesian shrimp exports generally account for a smaller share of the Chinese shrimp market than total world exports.

### Product Dynamics of Indonesian Frozen Shrimp Exports

Dynamic Export Product Value (EPD) is a tool used to see the competitive position of export products dynamically based on export growth and market share changes. The results of

the EPD analysis are categorized into four market positions; *Rising Star* in quadrant I, *Lost Opportunity* in quadrant II, *Retreat* in quadrant III, and *Falling Star* in quadrant IV.

Table 3. Value of EPD Calculation Results of Indonesian Frozen Shrimp in the China Market

Year	X (Frozen Shrimp Export Market Share Growth)	Y (Growth of Export Market Share of All Products)
2014	0.03	-0.003
2015	0.05	0
2016	-0.09	0.002
2017	-0.02	0.002
2018	-0.003	0.0002
2019	-0.01	0.004
2020	0.006	0.002
2021	-0.01	0.006
2022	0.008	0.008
2023	-0.0001	0.002

Analysis of Export Product Dynamics data for the period 2014-2023 shows that Indonesia's frozen shrimp export market share (X) in China developed differently than the growth of the export market share of all products (Y) in that market. Overall, fluctuations in X and Y values over the decade reflect the competitive dynamics of Indonesian frozen shrimp exports in the Chinese market. There are periods where the product shows strong competitiveness, but there are also phases of decline and loss of market share. This suggests that to maintain its position in key export markets such as China, Indonesia needs to maintain quality consistency, supply chain efficiency, and adapt its strategy to changing market preferences and global conditions.

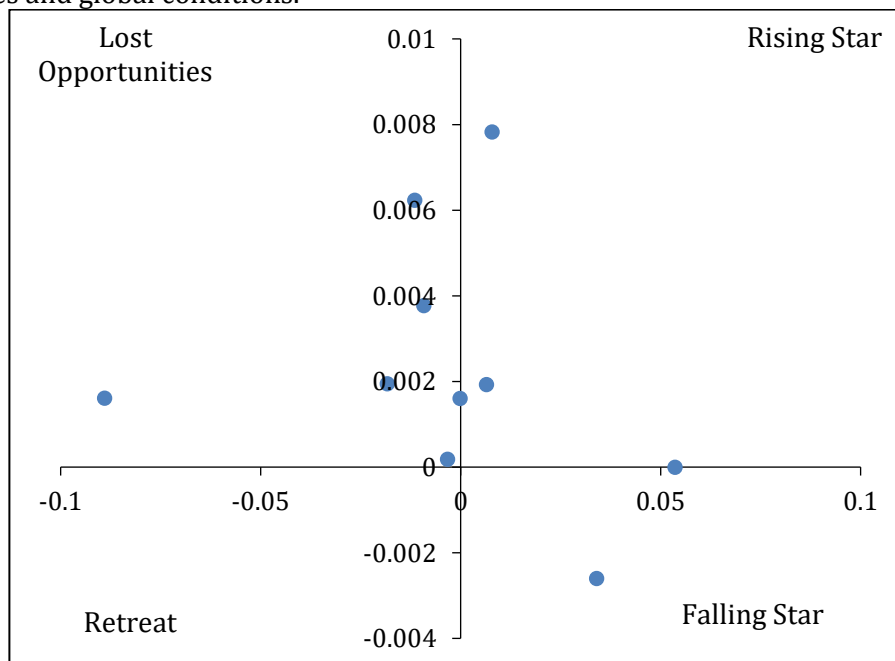


Figure 3. Diagram of Indonesia's Frozen Shrimp Position in the Chinese Market

In the diagram, the data points spread across the four quadrants show variations in the position of frozen shrimp exports. Most of the observations are placed in the Lost Opportunity quadrant. This position suggests that, during those years, while the overall export market experienced positive growth, Indonesia's share in the frozen shrimp market tended to decline. This pattern may imply that Indonesia was not fully able to benefit from the expansion of the

global market. However, it is important to note that the EPD framework only describes relative positioning and does not explain the underlying causes. The observed pattern may be associated with factors such as increasing competition from other exporting countries, as well as potential constraints related to price competitiveness, product quality, logistics, or trade regulations.

Interestingly, there are also improving product quality and diversifying export products, albeit in limited numbers. This position reflects the most favorable conditions as Indonesia was not only able to increase its frozen shrimp market share, but was also in the midst of general export market growth. This suggests that during these years, Indonesia's frozen shrimp competed effectively and was able to capitalize on the positive trends in the Chinese market. Conversely, a position in the *Falling Star* quadrant indicates that despite a general decline in the export market, Indonesia still recorded growth in frozen shrimp market share. While this can be seen as a relative strength, it is still something to be wary of as the overall market potential is declining.

Overall, Indonesia's frozen shrimp export performance in the Chinese market has been inconsistent and has more often shown *lost opportunities* than strategic gains. To strengthen its position in the future, strategies to improve competitiveness, product innovation, and market diversification are needed so that Indonesia can appear more in the *Rising Star* position and avoid the *Retreat* and *Lost Opportunities* quadrants.

Indonesia's frozen shrimp often fails to optimize market potential and must immediately improve distribution, price, and quality strategies in order to compete sustainably. Thus, practically this condition requires Indonesia to strengthen its frozen shrimp export strategy, through increasing production efficiency, standardizing quality according to Chinese market preferences, and strengthening bilateral trade relations so that exports can be more competitive and sustainable.

### **Strategy to Increase Frozen Shrimp Exports**

The first strategy that can be done is to focus on strengthening destination markets more evenly. Although Indonesia's frozen shrimp exports show an increase from year to year, the value is still dominated by the United States market. Meanwhile, the Chinese market, which is geographically closer and logistically more efficient, has not been fully utilized. Related to the decline in comparative competitiveness shown through RCA analysis, Indonesia must make structural improvements in the upstream and downstream sectors. The low RCA value indicates that Indonesia's frozen shrimp exports, especially to China, are starting to lose competitiveness compared to competing countries. To overcome this, modernization of the farming system is very important. In response to the weak dynamic competitiveness reflected in the EPD analysis, Indonesia must improve its adaptability to market changes. So far, the position of Indonesian shrimp exports to China is often in the *Lost Opportunity* category, which indicates that market growth opportunities have not been responded to optimally. To turn this position into a *Rising Star*, a proactive strategy is needed and focus on strengthening branding and trade promotion.

### **CONCLUSION**

Based on the results of data processing and discussion regarding the competitiveness of Indonesian frozen shrimp exports in the Chinese market during the 2014–2023 period, it can be concluded that the national export value of Indonesian shrimp generally experienced an upward trend, particularly during 2019–2023. Export performance to the Chinese market also showed a notable increase despite some fluctuations over time. However, based on the Revealed Comparative Advantage (RCA) analysis, Indonesia's comparative competitiveness in exporting frozen shrimp to China has fluctuated over the past decade. In the early period (2014–2016), Indonesia demonstrated a strong comparative advantage with high RCA values, but from 2019 to 2023, the RCA values consistently fell below one, indicating a decline in relative structural advantage in the Chinese market. Furthermore, the Export Product

Dynamics (EPD) analysis shows that Indonesia's frozen shrimp export position has predominantly been in the Lost Opportunity category, suggesting that although demand in the Chinese market has been increasing, Indonesia has not fully capitalized on this growth to maintain or expand its market share. This condition reflects relatively weak dynamic competitiveness, as well as less optimal adaptation and market penetration strategies in responding to evolving consumer preferences in China. Therefore, efforts to enhance Indonesia's frozen shrimp export performance should focus on three main strategies: expanding and strengthening export markets, improving comparative competitiveness, and adapting more effectively to global market dynamics.

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