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Export Performance of Indonesian Processed Tuna Commodities in the Japanese Market

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Abstract. Tuna commodity is globally competitive, but its performance is still below its competitor country, namely Thailand and is starting to compete with other countries, namely the Philippines, Vietnam and China. This study aims to evaluate the competitiveness performance and analyse the demand for processed tuna commodities in the Japanese market. Export competitiveness analysis is processed using the Revealed Comparative Advantage (RCA) index and the Revealed Competitiveness Advantage (RC) index. The level of competition and export demand will be analysed using the Almost Ideal Demand System (AIDS) model. The results showed that the export performance of Indonesian processed tuna commodities was comparatively and competitively competitive in the Japanese market. The demand for Indonesian processed tuna commodities in the Japanese market has fulfilled the demand theory. Indonesian processed tuna is a normal item for Japanese consumers. For Indonesia, processed tuna from competitor countries Thailand, the Philippines, Vietnam, and China are substitute goods. Thus, an increase in prices in these four countries will increase Indonesia's share. Cooperation with Thailand, Philippines, Vietnam, and China for processed tuna price strategy is not recommended.

Keywords: almost ideal demand system; revealed comparative advantage; revealed competitive advantage; tuna commodities

INTRODUCTION

The fisheries sector plays an important role in Indonesia's economic growth. The sector has contributed to Fisheries GDP by 2.58% in 2022. Fisheries GDP theoretically consists of several components, namely domestic fisheries product consumption and non-domestic fisheries product consumption (exports). Research by (Kementerian Kelautan dan Perikanan, 2023) shows that the export value of fishery products has a positive correlation with the value of fishery GDP at constant prices with a value of 85.93%. This shows that the main support for fisheries GDP is the export of fisheries products. One of Indonesia's capture fisheries export products is dominated by tuna commodities. This commodity plays an important role in fulfilling the consumption of tuna commodities in the world. The reason is because Indonesia produces the highest catch in the world. Indonesia's catch contributes 17% of the total global catch, followed by Vietnam at 8% and Ecuador at 5% (Food and Agriculture Organization, 2022).

The tuna commodity has become the main commodity of national fisheries, not only because of its high production, but also commodity group is able to meet the needs of domestic and foreign consumption (export). Tuna exports have been carried out in fresh, frozen and processed forms. Tuna exports experienced fluctuations and a sharp decline from 2013 to 2016, then began to increase until 2021 (Figure 1).

The value of tuna exports has continued to decline since 2013 until the lowest in 2016. This decline occurred due to a decrease in tuna production. The cause of the decline in production is the implementation of KP Regulation No. 56 of 2014, which is about a moratorium on fishing authorizations in WPPNRI. Furthermore, the use of various fishing gear types led to a decline in catch production (Dinas Komunikasi dan Informasi Jawa Timur, 2017). The increase in exports that began in 2016 occurred after President Joko Widodo implemented the Global Maritime Fulcrum (GMF) rules in full until now (Kartiko & Mursitama, 2022).

One of the main export markets for Indonesian tuna commodities is Japan. These are the following reasons. First, Japan has become the main export destination for Indonesian tuna fisheries. Japan absorbed 16% of Indonesia's tuna exports in 2021 (United Nations Comtrade, 2022). Second, Japan is one of the countries with the largest

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import needs for fishery products with the main products being tuna, shrimp, and salmon (Ministry of Trade 2021). Third, bilateral cooperation between Indonesia and Japan formed through the Indonesian-Japan Economic Partnership Agreement (IJEPA) has had an impact on trade growth for both countries. Fourthly, high demand for high value species such as bluefin tuna, big eye tuna, yellowfin tuna, and processed tuna.

Figure 1. Indonesia tuna export value in Japanese market 1989-2021 (Trade Map, 2023)

Tuna exports are carried out in three forms, namely fresh, frozen, and processed. Exports of these commodities are mostly in processed products with harmonized system (HS) code 160414. This study will specifically analyse processed tuna commodities. Processed tuna is the most exported product. Indonesian processed tuna will cover 21% of Japan's consumption in 2022 (Trade Map 2023). Indonesia's processed tuna exports are below competitor Thailand and above other countries, namely the Philippines, Vietnam, and China (Figure 2). Indonesia's processed tuna exports fluctuate, but tend to increase from 2001-2022. This fluctuation indicates competition with other countries. The largest producer of processed tuna exports is dominated by Thailand. The competition of processed tuna commodities can be seen in Figure 2.

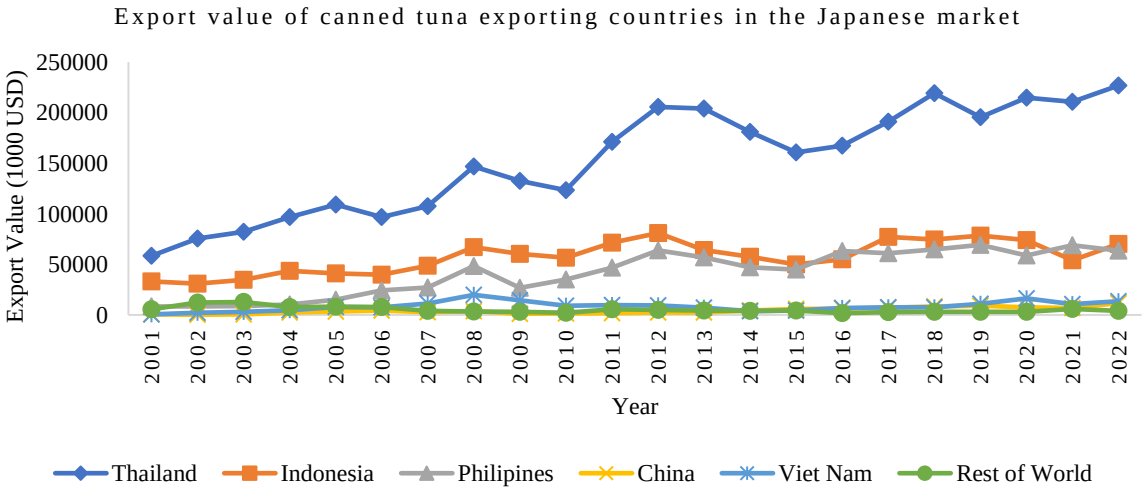

Figure 2. The competition of processed Tuna export in the Japanese Market (Trade Map, 2023)

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The fluctuating export trade value of processed tuna commodities (Figure 1) in Indonesia and other competing countries shows competition in the Japanese market (Figure 2) will affect the market share. Export market share is influenced by both price and non-price factors. Non-price factors, including taste, quality, and variances in elasticity of substitution across product markets, are predominant in explaining gains and losses in market share (Benkovskis & Wörz, 2018). Furthermore, price factors are affected by price competition from other countries that are in competition. (Wiranthi, 2021) found that the price of Vietnam, Indonesia's main competitor, has a significant influence on Indonesia's market share. The study also revealed a two-way causality relationship between Indonesia and Vietnam in terms of price transmission. Therefore, this study aims to evaluate the competitiveness performance of processed tuna exports and investigate the demand for braid to capture emerging opportunities for the development of Indonesian processed tuna exports in the Japanese market.

METHODS

The data used in this study are secondary data. The tuna commodities analysed are processed tuna with HS code 160414. The data used are export data of tuna commodities in 5 major exporting countries of Japan, namely Thailand, Indonesia, the Philippines, Vietnam, and China for the last 22 years (2001-2022). This data was obtained from the Trade Map agency.

The analysis method used in this research is quantitative. The quantitative method is used to analyse export competitiveness. Export competitiveness analysis is processed using the Revealed Comparative Advantage (RCA) index and the Revealed Competitive Advantage index. The level of competition and export demand will be analysed using the Almost Ideal Demand System (AIDS) model. This data processing uses Microsoft Excel and STATA.

Comparative and Competitiveness Analysis

Competitiveness analysis will be conducted using the RCA and RC indices. The Revealed Comparative Advantage (RCA) index was first used by Bela Balassa in 1965, that Balassa tried to separate the demarcation boundaries between countries based on revealed comparative advantage in certain sectors and countries that do not have it. A country has a comparative advantage if the RCA value > 1, and vice versa if 0 < RCA < 1, then the country has a comparative disadvantage of its products in the world market. In Indonesia, this method is widely used to analyse the export performance of superior food agricultural products (Wardani et al., 2018), such as cocoa (Ginting et al., 2021; (Masitah & Hasbiadi, 2022), coffee (Ginting et al., 2022), and others.

This approach is formulated in the following mathematical model.

$$RCA = \frac{X_{ad}/X_a}{X_{wd}/X_w} \quad \text{.....(1)}$$

Description:

Xad = Total exports of Indonesian processed tuna commodity groups to the Japanese market

Xa = Total exports of Indonesia to the Japanese market

Xwd = Total world exports of processed tuna commodities to Japan

Xw = Total world exports to the Japanese market

The Revealed Comparative Advantage (RCA) index has a drawback, which is that it contains asymmetric values. The asymmetry in the RCA index is that if a country has a comparative advantage, it will be valued between 1 and infinity and if the country does not have a comparative advantage, it will be valued between 0 and 1. This causes the need for additional other methods that are symmetrical so that it can be known exactly whether a country has a competitive advantage or not (Danna-Buitrago & Stellian, 2022).

The Revealed Competitive Advantage (RC) index is one of the alternative indices used because it is symmetric and this index has been used to measure competitiveness in agricultural products under the RCA model.

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This index is also known as the Vollrath index (Stellian et al., 2022). The Vollrath index states that RCA can be estimated under international competitiveness in four principle areas: Relative Trade Advantage (RTA), Revealed Competitiveness Index (RC), Relative Export Advantage (RXA), and Relative Import Advantage (RMA). Positive values on RXA, RTA, and RC indicate a country has a competitive advantage and vice versa. The Vollrath Index can be expressed as follows.

$$RMA = \left(\frac{M_{ad}}{M_{na}}\right) / \left(\frac{M_{dr}}{M_{nr}}\right) \quad \text{.....(2)}$$

$$RXA = \left(\frac{X_{ad}}{X_{na}}\right) / \left(\frac{X_{dr}}{X_{nr}}\right) \quad \text{.....(3)}$$

$$RTA = RXA - RMA \quad \text{.....(4)}$$

$$RC = Ln(RXA) - Ln(RMA) \quad \text{.....(5)}$$

Description:

Mad = Total imports of Indonesia's processed tuna commodity group

Mna =Total imports of Indonesia other than processed tuna commodity groups

Mdr = Total imports of processed tuna commodities from all countries, except Indonesia

Mnr = Total imports of all commodities except tuna commodities from all countries, except Indonesia.

Xad = Indonesia's total exports of processed tuna commodity groups

Xna = Total exports of Indonesia other than processed tuna commodity groups

Xdr = Total exports of processed tuna commodities from all countries, except Indonesia

Xnr = Total exports of all commodities, except processed tuna commodities from all countries, except Indonesia.

Demand Analysis

The AIDS model was introduced by Dealton and Muelbauer in 1980, and has subsequently grown in use in agricultural economics to analyse import and export demand (Alston et al., 1990). The two main assumptions made when applying AIDS to import or export demand analysis are product aggregation across import/export sources or precluding separability between goods. The implication of product aggregation is that prices aggregated across import sources change together by the same proportion (Yang & Koo, 1994). This model is a simultaneous equation processed using Seemingly Unrelated Regression (SUR). The dependent variable in this model is share, while the independent variables are price and revenue. The equation in this model is as follows.

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \, lnP_j + \beta_i ln\frac{x}{p^*} \quad \text{.....(6)}$$

The following is a mathematical model of the market share of processed tuna for Indonesia and other competing countries in the Japanese market.

$$\begin{aligned} w_{(t,i,f,v,c)} = {} & \alpha_{(t,i,f,v,c)} + \gamma_{(t,i,f,v,c)1} lnP_t + \\ & \gamma_{(t,i,f,v,c)2} lnP_i + \gamma_{(t,i,f,v,c)3} lnP_f + \\ & \gamma_{(t,i,f,v,c)4} lnP_v + \gamma_{(t,i,f,v,c)5} lnP_c + \\ & \gamma_{(t,i,f,v,c)6} lnP_r + \beta_{(t,i,f,v,c)} ln\frac{x}{p^*} \quad \text{.....(7)} \end{aligned}$$

Description:

α, γ, β = Regression parameters

w = Share of exporter tuna imports in the Japanese market

p = Export price of exporter tuna on the Japanese market (US$/ton)

x = Total import value of the Japan (tons)

p* = Stone's geometric price index

t = Thailand

i = Indonesia

f = Philippines

v = Vietnam

c = China

This model is formed with several assumptions, which are as follows.

1. Adding up:
   $\sum_{i=1}^{n} \alpha_i = 1, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \beta_i = 0$ …(8)
2. Homogeneity:
   $\sum_{i=1}^{n} \gamma_{ij} = 0$ ……..……..(9)
3. Symmetry:
   $\gamma_{ij} = \gamma_{ji}$ ……..……...(10)

The restrictions on this model can be seen in Table 1. After that, elasticity calculations were carried out consisting of uncompensated (own price), compensated

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(cross price), and expenditure (expenditure). The formula used is as follows.

1. Uncompensated elasticity

$$e_{ij} = -\delta_{ij} + \frac{\hat{\gamma}_{ij}}{\bar{w}_i} - \hat{\beta}_i \frac{\bar{w}_j}{\bar{w}_i} \quad \text{.....(11)}$$

2. Compensated elasticity

$$e_{ij}^{*} = -\delta_{ij} + \frac{\hat{\gamma}_{ij}}{\bar{w}_i} + \bar{w}_j \quad \text{.....(12)}$$

3. Expenditure elasticity

$$\eta_i = 1 + \frac{\hat{\beta}_{ij}}{\bar{w}_i} \quad \text{.....(13)}$$

Table 1. The restrictions on various version of the processed tuna product AIDS Model

Adding up	Homogeneity	Symmetry
$\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 = 1$	$\gamma_{11} + \gamma_{12} + \gamma_{13} + \gamma_{14} + \gamma_{15} = 0$	$\gamma_{12} = \gamma_{21}$
$\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 = 0$	$\gamma_{21} + \gamma_{22} + \gamma_{23} + \gamma_{24} + \gamma_{25} = 0$	$\gamma_{13} = \gamma_{31}$
$\gamma_{11} + \gamma_{21} + \gamma_{31} + \gamma_{41} + \gamma_{51} = 0$	$\gamma_{31} + \gamma_{32} + \gamma_{33} + \gamma_{34} + \gamma_{35} = 0$	$\gamma_{14} = \gamma_{41}$
$\gamma_{12} + \gamma_{22} + \gamma_{32} + \gamma_{42} + \gamma_{52} = 0$	$\gamma_{41} + \gamma_{42} + \gamma_{43} + \gamma_{44} + \gamma_{45} = 0$	$\gamma_{15} = \gamma_{51}$
$\gamma_{13} + \gamma_{23} + \gamma_{33} + \gamma_{43} + \gamma_{53} = 0$	$\gamma_{51} + \gamma_{52} + \gamma_{53} + \gamma_{54} + \gamma_{55} = 0$	$\gamma_{23} = \gamma_{32}$
$\gamma_{14} + \gamma_{24} + \gamma_{34} + \gamma_{44} + \gamma_{54} = 0$		$\gamma_{24} = \gamma_{42}$
$\gamma_{15} + \gamma_{25} + \gamma_{35} + \gamma_{45} + \gamma_{55} = 0$		$\gamma_{25} = \gamma_{52}$
		$\gamma_{34} = \gamma_{43}$
		$\gamma_{35} = \gamma_{53}$
		$\gamma_{34} = \gamma_{43}$
		$\gamma_{45} = \gamma_{54}$

RESULTS AND DISCUSSION

Comparative Advantage Analysis

The export performance of Indonesia's processed tuna commodities is measured through comparative and competitive advantage indices. The comparative advantage index uses the Revealed Comparative Advantage (RCA) method. This index is useful to analyse Indonesia's competitive position compared to other exporting countries (Thailand, Philippines, China, and Vietnam). The RCA values of Indonesia and other exporting countries can be seen in Figure 3.

Figure 3 shows the RCA value of Indonesia's processed tuna is in the range of 5.2943 - 8.4917. The RCA value of processed tuna in Thailand is in the range of 15.1679 - 22.7333 and in the Philippines in the range of 3.3198 - 16.4570. Indonesia's RCA value is under Thailand and the Philippines, but upper China and Vietnam. Research by (Jaimovich & Merella, 2015) suggests that when a country has a comparative advantage, it can produce goods or services with higher productivity and greater differentiation in their characteristics. This differentiation can relate to factors such as quality, branding, and after-sales service when compared to its trading partners.

Thailand's position is the highest among other exporting countries. This is because Thailand's total exports of processed tuna commodities are the highest among other exporting countries. Thailand's processed tuna exports have met 92% of global consumption needs. Havice & Campling, (2011) stated that the raw material factor is a factor that affects the export performance of canned tuna processing. Indonesia obtains tuna raw materials from domestic catches, but Indonesian tuna is not well managed so that the quality of Indonesian tuna is low (Chuenban et al., 2021). Meanwhile, Thai processed tuna obtains raw materials from cheap tuna raw materials from the Pacific and Indian Oceans, and then exports the final product in the form of processed tuna.

Figure 3 shows that the RCA value of the Philippines was greater than that of Indonesia since 2005 until now. This shows that there has been a shift in Japan's market share, so Indonesia's market share of processed tuna is getting smaller. The Business Intelligence Analysis Report (Kementerian Perdagangan Republik Indonesia, 2021) states that Indonesia needs to be very aware of the Philippines' processed tuna export performance due to this decline in market share.

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Competitiveness Advantage Analysis

Competitive advantage is measured using the Vollrath index method. This index has been used to measure competitiveness in agricultural products under the RCA model. This index has been known as the Vollrath Index in four principle areas, namely Relative Trade Advantage (RTA), Revealed Export Advantage (RXA), Revealed Import Advantage (RMA), and Revealed Competitive Advantage (RC). The value of the Vollrath Index Revealed Competitive Advantage (RC) of Indonesia in 2001-2022 can be seen in Table 2.

The RCA value in the previous section has shortcomings because it ignores the impact of economic policies, such as trade structures distorted by trade restrictions. This is shown by the RCA value only shows the value of exports, without analysing the value of imports. Therefore, Indonesia's RCA value, which has a comparative advantage, must be deepened with a competitive advantage seen from the export and import values.

The Revealed Trade Advantage (RTA) value is a value that shows the difference between the value of exports (Revealed Export Advantage (RXA)) and imports (Revealed Import Advantage (RMA)) of a country. The RTA value provides a comprehensive calculation of comparative advantage by combining exports and imports from trade relations between countries (Jambor & Babu, 2016). Indonesia has a positive RTA value every year. This is in line with the value of RXA. A positive RTA indicates that the value of exports (RXA) is greater than imports (RMA). Indonesia's RTA value is in the range of 3.4964 - 10.8215. The lowest value of RTA was in 2012-2013. This is because Indonesia was importing a lot of processed tuna from Japan.

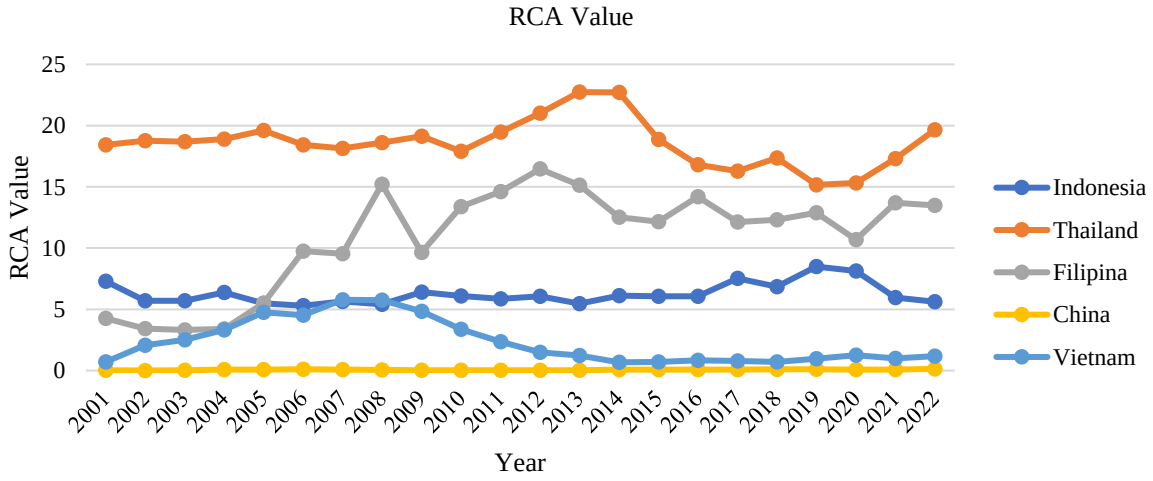

Figure 3. RCA value of processed tuna exporting countries in the Japanese market from 2001-2022

Competitive advantage is obtained through the natural logarithm (Ln) of RXA and RMA values. The difference between the natural logarithms of the two results in the value of competitive advantage (Revealed Competitiveness (RC)). Indonesia's competitive advantage has a positive value every year in the range of 0.7304 - 7.2009. The lowest RC value was in 2012-2013. This is in line with the RTA value. Indonesia's low RTA and RC values in 2012-2013 were due to Indonesia importing processed tuna from Japan, which lowered the RTA and RC values (Trade Map 2023). Research by Rindayati & Kristriana (2018) states that the rules that apply in exports affect the competitiveness of

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tuna fish products. The Japanese market has 47 rules from 2009-2013 for tuna products. mistakes in not fulfilling these rules will reduce the total exports that should be.

Demand Analysis of Indonesia Processed tuna

The Almost Ideal Demand System (AIDS) model in this study is a demand system that can analyse competition between the main exporting countries of processed tuna commodities in the Japanese market, namely Thailand, Indonesia, the Philippines, Vietnam and China. The discussion in this section is the analysis of competition among major exporting countries of processed tuna in the Japanese market (Table 3) and elasticity for each exporting country consisting of own price elasticity (uncompensated), cross price (compensated), and expenditure (Table 3).

Table 3 shows the estimation results of the AIDS model of processed tuna commodities in the Japanese market. The coefficient of determination in the AIDS model of Thailand, Indonesia, the Philippines, Vietnam, and China was 14.66%, 33.99%, 58.29%, 31.56%, and 16.61%, respectively. These results indicate that the share of processed tuna exports in the Japanese market from each country is as large as the coefficient of determination. Independent variables including the price of processed tuna from each country are jointly able to explain the export share of processed tuna from Thailand, Indonesia, Philippines, China, and Vietnam as indicated by the p-value of each country of significant at the 1% level. The independent variables of frozen tuna prices that are not significant at the 10% real level are Thailand's price in the Thailand and Philippines equation, Indonesia's price in the Indonesia equation, and the Philippines' price in the Philippines equation.

Table 3 shows the AIDS model equations of the five exporting countries, namely Thailand, Indonesia, Philippines, China, and Vietnam. The average export share of processed tuna in the Japanese market is highest in Thailand (56.79%), followed by Indonesia (21.99%), Philippines (14.09%), Vietnam (3.12%), and China (1.45%). The Indonesian AIDS model shows that a 1% increase in the price of Indonesian processed tuna will increase the import share of Indonesian processed tuna in the Japanese market by 0.1311%, decrease the import share of Thai processed tuna by 0.0907%, Philippines by 0.0206%, China by 0.0005%, and Vietnam by 0.0034%. The Thailand AIDS model shows that a 1% increase in the import price of processed tuna from Thailand will increase the import share of processed tuna from Thailand by 0.2143%, decrease the share of processed tuna from Indonesia by 0.0907%, Philippines by 0.1742%, China by 0.0007%, and increase the import share of processed tuna from Vietnam by 0.0015%.

The Philippines AIDS model shows that a 1% increase in the price of processed tuna from the Philippines will increase the share of processed tuna from the Philippines by 0.2211%, decrease the share of processed tuna from Thailand by 0.1742% and Indonesia by 0.0206%, and increase the share of processed tuna from China by 0.0004% and Vietnam by 0.0006%. The China AIDS model shows that a 1% increase in the price of processed tuna from China will increase the share of processed tuna from China by 0.0007%, decrease the share of processed tuna from Thailand by 0.0007% and Indonesia by 0.0005%, and increase the share of processed tuna from the Philippines by 0.0004% and Vietnam by 0.0003%. The Vietnam AIDS model shows that a 1% increase in the price of processed tuna from Vietnam will increase the share of processed tuna from Vietnam by 0.0012%, decrease the share of processed tuna from Indonesia by 0.0034%, and increase the share of processed tuna from Thailand by 0.0015%, the Philippines by 0.0006% and China by 0.0002%.

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Table 2. Competitive analysis of Indonesian processed tuna in the Japanese market from 2001-2022.

Year	RTA	RXA	RC
2001	10.4547	10.5943	4.3291
2002	7.4479	7.4901	5.1814
2003	7.5395	7.5571	6.0669
2004	8.6656	8.6788	6.4891
2005	7.0423	7.0707	5.5152
2006	6.7621	6.8024	5.1288
2007	7.4293	7.4587	5.5401
2008	7.0165	7.0657	4.9668
2009	8.5961	8.6025	7.2009
2010	8.0846	8.1373	5.0384
2011	7.5901	7.6346	5.1430
2012	4.6775	7.7936	0.9167
2013	3.4964	6.7456	0.7304
2014	7.5177	7.5989	4.5381
2015	7.4271	7.4426	6.1709
2016	7.4219	7.4333	6.4794
2017	9.0549	9.7039	2.7048
2018	8.0499	8.5525	2.8342
2019	10.8215	10.8416	6.2894
2020	10.1458	10.1725	5.9395
2021	7.0335	7.0396	7.0364
2022	6.8652	6.8765	6.4057

Table 3. AIDS model estimation results

Variable	Equation				
	Thailand	Indonesia	Philippines	China	Vietnam
w	56,79%	21,99%	14,09%	1,45%	3,12%
Price of Thailand	0,2143	-0,0907***	-0,1742***	-0,0007***	0,0015***
Price of Indonesia	-0,0907***	0,1311	-0,0206**	-0,0005***	-0,0034***
Price of Philippines	-0,1742***	-0,0206**	0,2211	0,0004***	0,0006***
Price of China	-0,0007***	-0,0005***	0,0004***	0,0007***	0,0002***
Price of Vietnam	0,0015***	-0,0034***	0,0006***	0,0003***	0,0012***
Price of *rest of world*	0,0498**	-0,0158**	-0,0273**	-0,0001***	-0,0001***
x	-0,0428**	-0,0355**	0,0658*	0,0035**	0,0253**
R^2	0,1466	0,3399	0,5829	0,3156	0,1661
Chi-square	83,240	134,87	377,87	124,71	57,48
p-value	0,0000***	0,0000***	0,0000***	0,0000***	0,0000***

Description: *** Significant at level 1%, ** Significant at level 5%, * Significant at level 10%

The expenditure elasticities of the exporting countries are positive (Table 4). This indicates that the processed tuna commodities from the five countries are normal onions. Indonesia has an expenditure elasticity value of 0.8385, which means that if there is an increase in import expenditure of processed tuna from the Japanese market by 1%, the import expenditure will increase the demand for processed tuna exports from Indonesia by 0.8385%. This is in line with the research of (Hsu et al., 2023) which states that the expenditure elasticity for Japanese fishery commodities in Japan is greater than 1 or close to 1. This value indicates that Japanese consumers have a relatively high dependence on fishery imports. This elasticity value also shows that the expenditure elasticity is inelastic because the value is less than 1, which means that Indonesian processed tuna is not sensitive to changes in total expenditure. The expenditure elasticity of processed tuna in the Philippines, China and Vietnam is more than 1. This shows that processed tuna from these countries is a luxury good when compared to Indonesia and Thailand (Mal et al., 2021).

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Table 4. Elasticity estimation

Elasticities	Countries				
	Thailand	Indonesia	Philippines	China	Vietnam
Uncompensated					
Price of Thailand	-0,6655***	-0,5042***	-0,9707***	0,0880*	0,5100
Price of Indonesia	-0.1763***	-0,4395***	-0,0435***	0,0178**	0,0680*
Price of Philippines	-0,3173***	-0,1165***	0,6353	0,0600*	0,1329
Price of China	-0,0023***	-0,0047***	0,0095***	-0,9497***	0,0200**
Price of Vietnam	0,0003***	-0,0207***	0,0186**	0,0252**	-0,9360***
Price of Rest of world	0,0857*	-0,0758***	-0,1820***	-0,0007***	0,0172**
Compensated					
Price of Thailand	-0,0547***	0,1555	-0,6681***	0,5193	0,6167
Price of Indonesia	0,0602*	-0,1840***	0,0736*	0,1848	0,1093
Price of Philippines	-0,1658***	0,0472**	0,7104	0,1669	0,1593
Price of China	0,0133**	0,0122**	0,0173**	-0,9385***	0,0228**
Price of Vietnam	0,0339**	0,0155**	0,0353**	0,0488**	-0,9301
Price of Rest of world	0,1130	-0,0464***	-0,1685***	0,0185**	0,0219**
Expenditure	0,9246	0,8385	1,4673	1,2408	1,8122

Description: ***Significant at level 1%, ** Significant at level 5%, * Significant at level 10%

The cross-price elasticity (compensated) shows the level of export competition between processed tuna commodities Indonesia, Thailand, Philippines, China, and Vietnam in the Japanese market. The cross-price elasticity of Indonesia against processed tuna Thailand, Philippines, China, and Vietnam 0.1555; 0.0472; 0.0122; and 0.0155 (Table 4). This value indicates that for Indonesia, processed tuna Thailand, Philippines, China, and Vietnam is a substitute commodity. This value indicates that if there is an increase in the price of processed tuna of Thailand, Philippines, China, and Vietnam, it will increase the share of processed tuna of Indonesia by 0.1555%; 0.0472%; 0.0122%; and 0.0155%. Thailand's cross-elasticity value indicates that for Thailand, processed tuna from the Philippines is a complementary commodity and processed tuna from Indonesia, China, and Vietnam is a substitute commodity. The cross-elasticity value for the Philippines indicates that for the Philippines, processed tuna from Thailand is a complementary commodity and processed tuna from Indonesia, China, and Vietnam is a substitute commodity. The cross-elasticity value for China indicates that for China, processed tuna from Thailand, Indonesia, Philippines, and Vietnam are substitute commodities. The cross-elasticity value for Vietnam indicates that for Vietnam, processed tuna from Thailand, Indonesia, Philippines, and China are substitute commodities.

CONCLUSION

Indonesia's export performance of processed tuna commodities is comparatively and competitively competitive in the Japanese market. Indonesia can compete with other exporting countries to fill its export capacity. This means that Indonesia does have a specialisation in processed tuna products due to the results of its high natural resources. In addition, the policies that Indonesia applies to these commodities are appropriate and supportive of their utilisation. Trade policies have encouraged the allocation of resources to sectors that have comparative advantage. The trend of the comparative advantage value of processed tuna has decreased because Indonesia has lost market share due to competition and the quality of processed tuna is below the processed tuna of Thailand and the Philippines.

The price of exporting country strongly influences competition with other exporting countries. A 1% increase in the price of

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Indonesian processed tuna will increase the import share in the Japanese market by 0.1131% and reduce the import share of processed tuna from competing countries, namely Thailand (0.0907%), the Philippines (0.0206%), China (0.0005%), and Vietnam (0.0034%). The demand for Indonesian processed tuna commodities in the Japanese market has fulfilled the theory of demand. Indonesian processed tuna is a normal good for Japanese consumers. For Indonesia, processed tuna from competitor countries Thailand, Philippines, Vietnam, and China are substitute goods. Increasing prices in these four countries will increase Indonesia's share. Cooperation with Thailand, Philippines, Vietnam, and China for processed tuna price strategy is not recommended.

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