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Determinants of Indonesian Processed Tuna Export Performance in the Japanese Market: An Empirical Analysis of IJEPA Tariff Preferences and MHLW Sanitary Regulations

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Abstract: Indonesia possesses abundant tuna resources and benefits from preferential tariff facilities under the Indonesia–Japan Economic Partnership Agreement (IJEPA). However, the export volume of Indonesian processed tuna to Japan continues to fluctuate despite tariff reductions and increasingly stringent sanitary regulations imposed by Japan's Ministry of Health, Labour and Welfare (MHLW). This study aims to examine the effects of IJEPA tariff preferences and MHLW sanitary regulations on the export volume of Indonesian processed tuna exported to Japan. A quantitative explanatory approach was employed using monthly secondary time-series data from January 2020 to December 2024, comprising 60 observations. The data were analyzed using multiple linear regression following classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation, followed by partial, simultaneous, and coefficient of determination analyses. The findings reveal that neither IJEPA tariff preferences nor MHLW sanitary regulations significantly affect export volume, either individually or simultaneously. The novelty of this study lies in integrating tariff preferences and sanitary regulations within a single empirical model interpreted through the Blue Economy perspective. Practically, the findings recommend improving logistics efficiency, food safety compliance, and fisheries governance. This study contributes to international trade literature by demonstrating that structural factors beyond trade policy instruments play a more decisive role in sustaining Indonesia's processed tuna exports to the Japanese market.

Keywords: Blue Economy, IJEPA Tariff, MHLW Sanitary Regulation, Processed Tuna, Sustainable Export Volume

A. Introduction

Indonesia, as the world's largest archipelagic country with approximately 6.4 million km² of marine waters, possesses enormous marine resource potential. However, this comparative advantage has not yet been effectively transformed into sustainable competitiveness in international markets, particularly in Japan (Fitriana & Ciptaningtyas, 2025; Kristiani et al., 2024). Japan is one of Indonesia's strategic trading partners and a major export destination for fishery products, especially processed

tuna (HS Code 1604.14), supported by preferential tariff facilities of 0% under the Indonesia–Japan Economic Partnership Agreement (IJEPA) and the ASEAN–Japan Comprehensive Economic Partnership (AJCEP) (Kristiani et al., 2024). Despite enjoying improved market access through these preferential schemes, Indonesia's market share of processed tuna in Japan has not increased in line with its resource potential and tariff advantages (Nurkhasanah, 2026). This condition indicates a gap between comparative and competitive advantage, highlighting the need to identify the factors constraining the improvement of Indonesia's tuna export competitiveness in the Japanese market (Kristiani et al., 2024).

International trade theory explains that export performance is determined not only by a country's comparative advantage but also by trade policies, institutional arrangements, and non-tariff regulations imposed by importing countries. According to the Theory of Comparative Advantage proposed by Ricardo (1817), countries can improve their export performance by specializing in commodities that can be produced relatively more efficiently than other nations. However, contemporary international trade extends beyond comparative production efficiency, as preferential trade agreements and non-tariff measures increasingly shape market access and export competitiveness. Within this context, preferential tariff schemes such as the Indonesia–Japan Economic Partnership Agreement (IJEPA) are expected to reduce trade costs and enhance export competitiveness, whereas sanitary regulations imposed by importing countries may function as non-tariff barriers by increasing exporters' compliance costs and affecting market access (Kristiani et al., 2024).

Table 1. Top Five Suppliers of Processed Tuna (HS 1604.14) to Japan (2020–2024)

No	Supplier Country	2020	2021	2022	2023	2024
1	Thailand	214.442	211.236	229.880	262.540	228.231
2	Indonesia	73.866	54.141	70.905	77.364	73.773
3	Filipina	58.694	69.051	64.349	51.078	53.496
4	Vietnam	16.443	10.656	13.982	12.560	15.626
5	China	7.453	6.879	11.783	13.126	10.662
Japan's Total Imports (World		374.001	357.738	394.899	420.775	384.741

Source: Trademap.org

The data presented in Table 1 reveal a substantial export performance gap between Indonesia and its primary competitor, Thailand. During the 2020–2024 period, Thailand consistently dominated the Japanese processed tuna market, with an average export value exceeding USD 220 million, whereas Indonesia's exports fluctuated around USD 70 million and declined markedly in 2021. Although both countries benefit from preferential market access under regional trade agreements, these differences suggest that factors beyond tariff preferences may influence export performance. Such factors may include differences in production efficiency, logistics systems, product quality, supply chain management, and compliance with importing-country requirements (Osmaleli et al., 2023). Therefore, the observed disparity indicates the need for further empirical investigation into the determinants of

Indonesia's processed tuna export performance in the Japanese market (Malau et al., 2026). According to data from the International Trade Centre (ITC) for the 2020–2024 period, the global import value of processed tuna remained substantial, ranging between USD 8 billion and USD 9 billion, with Japan consistently ranking among the world's largest importers (Kristiani et al., 2024). Despite representing an important premium export destination, Indonesia's processed tuna exports (HS Code 1604.14) to Japan fluctuated and generally declined from USD 55.4 million in 2020 to USD 42.8 million in 2024. This trend indicates that preferential market access alone may not be sufficient to sustain export growth and highlights the importance of examining other determinants that may influence Indonesia's processed tuna export performance (Nurkhasanah, 2026).

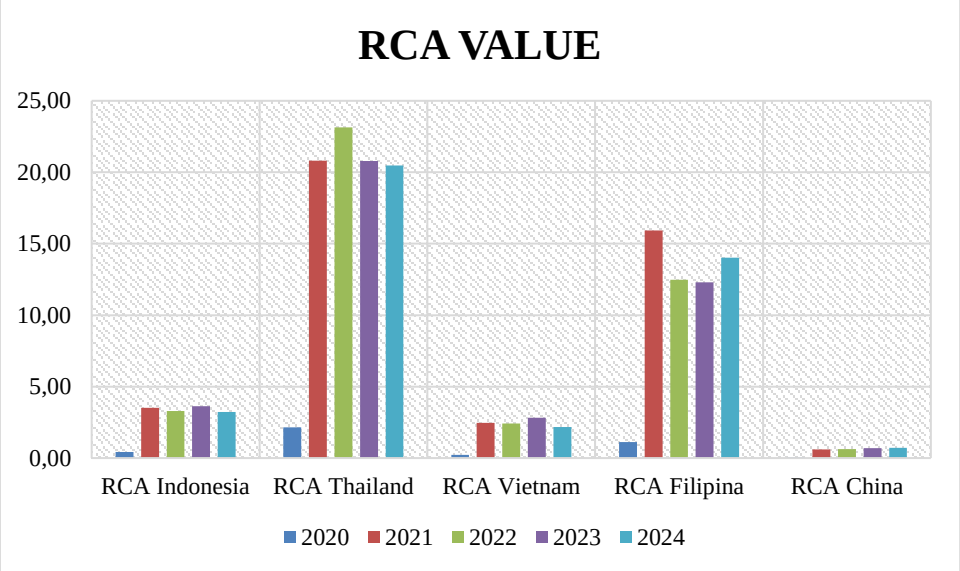

Figure 1. RCA Values of Processed Tuna Exporting Countries in the Japanese Market (2020–2024) Source: www.trademap.org

The disparity in export competitiveness between Indonesia and Thailand, as illustrated by the fluctuations presented in Table 1 and the Revealed Comparative Advantage (RCA) values in Figure 1, provides an important empirical context for this study. During the 2020–2024 period, Thailand consistently maintained a stronger position in the Japanese processed tuna market despite possessing relatively smaller marine resources and an Exclusive Economic Zone (EEZ) than Indonesia. In 2024, Thailand's processed tuna exports reached USD 228.231 million, compared with Indonesia's export value of USD 73.773 million. These differences suggest that export competitiveness is influenced not only by natural resource endowment but also by other structural and institutional factors that may affect firms' ability to compete in international markets (Rindayati & Kristriana, 2018; Zainuddin et al., 2024).

The observed disparity further indicates that abundant marine resources alone may not be sufficient to achieve sustainable export competitiveness without efficient

processing systems, integrated logistics, effective supply chain management, and consistent compliance with the non-tariff requirements imposed by importing countries (Fitriana & Ciptaningtyas, 2025). Therefore, understanding the determinants of Indonesia's processed tuna export performance requires considering both trade facilitation measures and regulatory barriers that may influence exporters' market access and operational efficiency (Khoerunnisa & Fatoni, 2026). Indonesia's relatively weaker export performance also raises questions regarding the effective utilization of the preferential tariff facilities provided under the Indonesia–Japan Economic Partnership Agreement (IJEPA). According to the ITC Market Access Map (2025), a proportion of Indonesian exporters continued to pay effective tariffs averaging approximately 5%, suggesting that preferential tariff facilities may not have been fully utilized. However, the underlying factors contributing to this condition remain insufficiently explained in the existing literature and therefore warrant further empirical investigation (Malau et al., 2026). In addition to tariff preferences, Japanese market access is governed by stringent non-tariff measures, particularly sanitary regulations administered by the Ministry of Health, Labour and Welfare (MHLW). These regulations require imported fishery products to comply with microbiological and chemical safety standards designed to protect public health. Shipments that fail to satisfy these standards may be rejected or returned to the exporting country. Although such sanitary regulations are frequently considered potential barriers to trade, their actual influence on Indonesia's processed tuna export volume has not yet been consistently demonstrated through empirical evidence, thereby justifying further investigation (Ardiyanti & Saputri, 2018; Zainuddin et al., 2024).

Table 2. Rejected Export Shipments of Indonesian Fishery Products by Japan's MHLW (2020–2024) Source: www.mhlw.go.jp

Year	Total Rejection Cases (Indonesia)	Predominant Quality and Sanitary Violations
2020	12	Positive Coliform bacteria, positive E. coli, Furazolidone residues
2021	27	Positive Coliform bacteria, positive E. coli, Procymidone residues
2022	45	Coliform bacteria, cyanide contamination, Triazophos residues
2023	19	Live bacterial count, Coliform, positive E. coli
2024	14	Coliform, E. coli, Procymidone and Enrofloxacin residues
Total	117	Predominantly microbiological contamination (bacteria and Coliform)

The implementation of preferential tariff facilities under the Indonesia–Japan Economic Partnership Agreement (IJEPA) occurs within a trade environment characterized by increasingly stringent non-tariff measures (NTMs) imposed by the Japanese authorities. Although import tariffs on eligible products have been reduced to 0%, Japan continues to strengthen consumer protection through rigorous food safety regulations administered by the Ministry of Health, Labour and Welfare (MHLW), reflecting the increasing role of sanitary and phytosanitary (SPS) measures in regulating international agri-food trade (Jin et al., 2024). Accordingly, imported fishery products must comply with microbiological inspections and chemical residue

testing before entering the Japanese market. As presented in Table 2, a total of 117 Indonesian fishery export shipments were rejected during the 2020–2024 period, with the highest number of cases recorded in 2022 (45 shipments).

The reported rejection cases were primarily associated with microbiological contamination, including Coliform and Escherichia coli (E. coli), as well as violations of permissible chemical residue limits. Shipments that do not satisfy the required sanitary standards may be rejected or returned to the exporting country in accordance with MHLW regulations. These enforcement measures indicate that compliance with sanitary requirements remains an important consideration for Indonesian fishery exporters (Tristi et al., 2021). Previous studies have suggested that food safety systems, quality control practices, and cold-chain management play important roles in maintaining the quality of processed tuna throughout post-harvest handling and international distribution. However, despite the existence of these sanitary measures, empirical evidence regarding their direct influence on Indonesia's processed tuna export volume remains inconclusive because SPS measures may either facilitate trade by enhancing consumer confidence or restrict trade by increasing exporters' compliance costs (Jin et al., 2024). This uncertainty highlights the need for further empirical investigation into whether sanitary regulations constitute a significant determinant of export performance in the Japanese market.

Table 3. Comparison of Market Access and Utilization of Preferential Tariffs for Processed Tuna (HS 1604.14) in Japan (2024) Source: ITC Market Access Map and Ministry of Marine Affairs and Fisheries of the Republic of Indonesia Press Release (2024), processed by the authors

Exporting Country	Export Value 2024 (Thousand USD)	MFN Tariff (%)	Effectively Applied Tariff (%)
Indonesia	73,885	9.60	0.00
Thailand	228,193	9.60	0.00
Vietnam	15,548	9.60	0.00
Philippines	53,471	9.60	4.80
China	10,593	9.60	9.60

Table 3 indicates that although Indonesia benefits from preferential tariff facilities under the Indonesia–Japan Economic Partnership Agreement (IJEPA), a proportion of exporters continue to incur effective tariffs, suggesting that the utilization of these preferences may not yet be fully optimized (ITC Market Access Map, 2025). At the same time, Indonesian processed tuna exporters are required to comply with stringent sanitary regulations imposed by Japan's Ministry of Health, Labour and Welfare (MHLW). These conditions illustrate that market access is influenced by both tariff preferences and non-tariff regulatory requirements (Jin et al., 2024).

Previous studies have generally examined the effects of preferential trade agreements, tariff reductions, or sanitary regulations separately in explaining export performance (Kristiani et al., 2024). Limited empirical evidence simultaneously investigates the influence of IJEPA tariff preferences and MHLW sanitary regulations on the export volume of Indonesian processed tuna in the Japanese market using recent monthly time-series data. Moreover, previous studies have rarely interpreted export competitiveness within the Blue Economy perspective, particularly in relation to sustainable fisheries governance and food safety management. This study addresses these gaps by integrating both trade policy instruments into a single empirical model while employing the Blue Economy as an analytical perspective rather than as an empirical variable. The Blue Economy emphasizes the sustainable utilization of marine resources through environmentally responsible production, efficient resource management, and compliance with international quality standards to support long-term economic growth. In the fisheries sector, these principles highlight the importance of sustainable harvesting, effective cold-chain management, and food safety systems in enhancing export competitiveness (Jin et al., 2024). Accordingly, this study aims to examine the effects of IJEPA tariff preferences and MHLW sanitary regulations, both individually and simultaneously, on the export volume of Indonesian processed tuna to Japan while interpreting the findings from the perspective of the Blue Economy to provide policy recommendations for strengthening Indonesia's fisheries export competitiveness.

B. Methods

This study employed a quantitative approach using an explanatory research design to analyze the effects of the utilization of IJEPA tariff preferences (X_1) and the sanitary restrictions imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) (X_2) on the export volume of Indonesian processed tuna (HS Code 1604.14) to Japan (Y). An explanatory research design was considered appropriate because the primary objective of this study was to examine the causal relationships among the proposed variables based on international trade theory and empirically test the formulated hypotheses using statistical analysis. This approach enables the identification of the magnitude and direction of the relationships between the independent variables and export volume, making it suitable for explaining variations in Indonesia's processed tuna exports to the Japanese market.

The study utilized monthly secondary time-series data covering the period from January 2020 to December 2024, comprising 60 observations selected through purposive sampling. The study period was selected based on the relevance of recent international trade dynamics, the implementation of preferential tariff policies and sanitary regulations, and the availability of complete and consistent monthly data. Export volume data were obtained from the International Trade Centre (ITC) Trade Map, IJEPA tariff information from the Market Access Map (MacMap), and sanitary enforcement data from Japan's Ministry of Health, Labour and Welfare (MHLW).

Data were collected using the documentation method by compiling and verifying official publications obtained from the ITC Trade Map, Market Access Map (MacMap), and MHLW databases. To enhance data reliability, all datasets were cross-checked to ensure consistency in reporting periods, commodity classification (HS Code 1604.14), and measurement units before analysis. Nevertheless, this study recognizes several limitations associated with secondary data. Reporting delays, institutional revisions, and differences in recording procedures may introduce measurement errors. Furthermore, MHLW rejection records represent officially reported sanitary enforcement cases and may not capture all compliance issues experienced by exporters. These limitations should therefore be considered when interpreting the empirical findings. The dependent variable was the export volume of Indonesian processed tuna exported to Japan, measured using monthly export volume data reported by the ITC Trade Map. The first independent variable, the utilization of IJEPA tariff preferences, was operationalized using the effective tariff rate applied to Indonesian processed tuna exports under the IJEPA preferential scheme as reported in the Market Access Map (MacMap). The second independent variable, MHLW sanitary restrictions, was measured by the monthly number of export rejection cases resulting from microbiological contamination and chemical residue violations reported by Japan's Ministry of Health, Labour and Welfare (MHLW). These operational definitions were established to ensure consistency between the conceptual framework and the empirical measurements employed in the regression model.

All data were analyzed using statistical software through descriptive statistical analysis followed by classical assumption tests, including normality, heteroscedasticity, multicollinearity, and autocorrelation tests, before estimating the multiple linear regression model to ensure compliance with the assumptions of the Ordinary Least Squares (OLS) method (Boot, 2023). Hypothesis testing was conducted using multiple linear regression analysis through partial tests (t-test), simultaneous tests (F-test), and the coefficient of determination (Adjusted R^2) to examine both the individual and joint effects of the independent variables on the export volume of Indonesian processed tuna exported to Japan. The statistical findings were subsequently interpreted by relating the empirical evidence to international trade theory and the Blue Economy perspective. In this study, the Blue Economy was employed as an analytical framework to interpret the implications of the findings for sustainable fisheries governance and export competitiveness rather than as an empirical variable included in the regression model. This approach provides both theoretical and practical insights for strengthening Indonesia's processed tuna exports in the Japanese market (Keil, 2023).

C. Results and Discussion

1. Results

Descriptive Statistical Analysis

Table 4. Results of Descriptive Statistical Analysis

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
IJEPA Tariff	60	0.00	5.00	4.0000	2.01688
MHLW	60	0.00	11.00	1.9500	2.07017
Export Volume	60	1,361.00	7,664.00	4,223.2833	1,152.53973
Valid N (listwise)	60				

Based on the descriptive statistical results, the export volume of processed tuna has a minimum value of 1,361.00, a maximum value of 7,664.00, a mean of 4,223.28, and a standard deviation of 1,152.54. Since the standard deviation is lower than the mean, the data distribution can be considered relatively stable and appropriate for econometric analysis. The utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) tariff preferences ranges from an effective tariff of 0.00% to 5.00%, with a mean of 4.00% and a standard deviation of 2.016, indicating that the utilization of preferential tariff facilities through Certificates of Origin (COO) has not yet been fully optimized. Meanwhile, the sanitary restriction variable imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) shows cargo rejection frequencies ranging from 0 to 11 cases, with an average of 1.95 cases and a standard deviation of 2.070. These findings indicate that non-tariff barriers in the form of sanitary requirements continue to occur consistently and may adversely affect the export performance of Indonesian processed tuna in the Japanese market (Kristiani et al., 2024).

Normality Test

Graphical Analysis

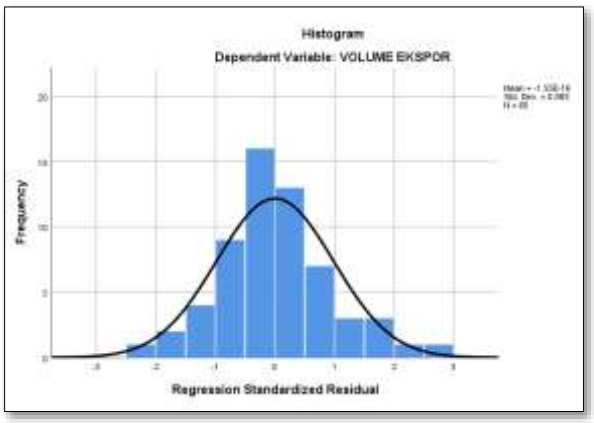

Figure 2. Histogram of the Normality Test

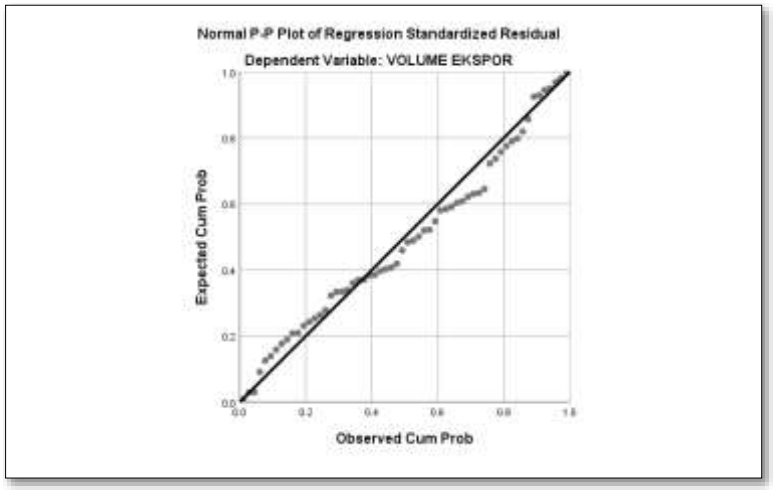

Figure 3. Normal P–P Plot of the Normality Test

The visual inspection presented in Figure 2 shows that the residual distribution forms a symmetrical bell-shaped curve without exhibiting noticeable skewness toward either side of the axis. This observation is further supported by the distribution of data points in Figure 3, which converge closely along the diagonal reference line. Collectively, these graphical patterns provide preliminary empirical evidence that the regression model possesses normally distributed residuals. To eliminate subjectivity in the interpretation of graphical outputs, the normality of the residual distribution was further verified statistically using the non-parametric One-Sample Kolmogorov–Smirnov Test. The results of the residual analysis are presented in Table 5.

Statistical Analysis

Table 5. Results of the Normality Test (One-Sample Kolmogorov–Smirnov Test)

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		60
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1152.33815852
Most Extreme Differences	Absolute	.103
	Positive	.103
	Negative	-.055
Test Statistic		.103
Asymp. Sig. (2-tailed)		.184[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

The normality test was conducted using the One-Sample Kolmogorov–Smirnov Test to objectively verify the visual assessment by comparing the residual distribution with the theoretical normal distribution. The test employed a significance level of 5%, with the decision criterion that an Asymp. Sig. (2-tailed) value greater than 0.05 indicates

normally distributed residuals. The analysis produced an Asymp. Sig. (2-tailed) value of 0.184, indicating that the null hypothesis (H_0) is accepted because the significance value exceeds 0.05. Therefore, the residuals are normally distributed, confirming that the normality assumption has been satisfied and that the Ordinary Least Squares (OLS) regression model is appropriate for subsequent hypothesis testing.

Multicollinearity Test

Table 6. Results of the Multicollinearity Test (Coefficients)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4207.580	349.597		12.036	.000		
	TARIF IJEPA	-1.229	77.093	-.002	-.016	.987	.964	1.038
	MHLW	10.574	75.108	.019	.141	.889	.964	1.038

a. Dependent Variable: Export Volume

The multicollinearity test was conducted to determine whether a strong correlation existed among the independent variables using the Tolerance and Variance Inflation Factor (VIF) indicators. A regression model is considered free from multicollinearity when the Tolerance value exceeds 0.10 and the VIF value is below 10. The results indicate that both the utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) tariff preferences (X_1) and Japan's Ministry of Health, Labour and Welfare (MHLW) sanitary restrictions (X_2) have a Tolerance value of 0.964, satisfying the established criterion. Likewise, both variables have a VIF value of 1.038, which is substantially below the maximum acceptable threshold of 10. Therefore, the regression model is free from multicollinearity, indicating that the Ordinary Least Squares (OLS) parameter estimates are valid, unbiased, and suitable for subsequent hypothesis testing.

Autocorrelation Test

Table 7. Results of the Autocorrelation Test (Model Summary)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.105[a]	.011	-.024	764.97505	1.793

a. Predictors: (Constant), MHLW, TARIF IJEPA
b. Dependent Variable: Export Volume

The autocorrelation test was performed using the Durbin–Watson (DW) Test to determine whether the regression residuals were correlated across observations. The analysis produced a Durbin–Watson value of 1.793. Based on the sample size (n = 60) and the number of independent variables (k = 2), the lower bound (dL) and upper bound (dU) values were 1.514 and 1.652, respectively. According to the Durbin–

Watson decision criterion, the model is considered free from autocorrelation when dU < DW < 4 − dU. Since the obtained value satisfies 1.652 < 1.793 < 2.348, the regression model meets the required criterion. Accordingly, the null hypothesis (H_0) is accepted, indicating that the model does not suffer from autocorrelation and is therefore appropriate for further analysis and hypothesis testing.

Heteroscedasticity Test

The heteroscedasticity test was conducted to determine whether the residual variance remained constant across observations. A well-specified regression model is expected to exhibit homoscedasticity, meaning that the residual variance is constant. Heteroscedasticity was examined using two complementary approaches: graphical analysis through a Scatterplot and statistical testing using the Glejser Test.

Graphical Analysis (Scatterplot)

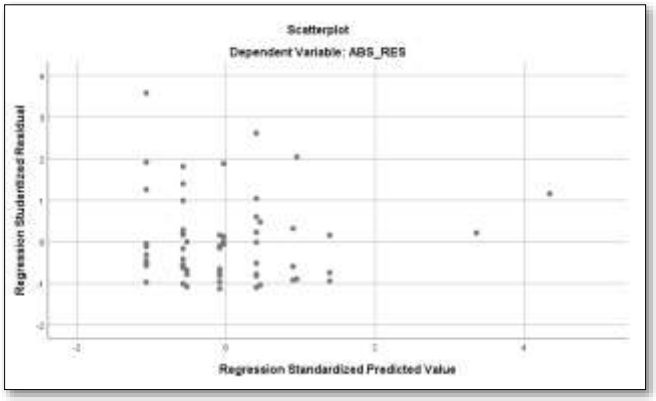

Figure 4. Scatterplot of the Heteroscedasticity Test

Based on the Scatterplot presented above, the data points are randomly distributed, are not concentrated in a specific area, and are dispersed both above and below the zero value on the Y-axis. Furthermore, the distribution of the data points does not exhibit any systematic pattern, such as a wave-like, expanding, or narrowing pattern. Visually, these findings indicate that the regression model does not exhibit heteroscedasticity.

Statistical Analysis (Glejser Test)

Table 8. Glejser Heteroscedasticity Test Results (Coefficients))

Coefficients[a]							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	820.840	228.111		3.598	.001		
1 TARIF IJEPA	-8.627	50.303	-.023	-.171	.864	.964	1.038
MHLW	38.984	49.008	.107	.795	.430	.964	1.038
a. Dependent Variable: ABS_RES							

Based on Table 8, the estimated Glejser test equation is: $|ei| = 820{,}840 - 8{,}627X_1 + 38{,}984X_2$. A regression model is considered free from heteroscedasticity when the significance value of each independent variable exceeds 0.05. The test results indicate that the Utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) Tariff Preferences (X_1) has a significance value of 0.864, while the Sanitary Restrictions Imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) (X_2) has a significance value of 0.430. Since both significance values are greater than 0.05, the model satisfies the criterion for the absence of heteroscedasticity. Therefore, the regression model does not exhibit heteroscedasticity, indicating that the residuals have constant variance (homoscedasticity). Consequently, the regression model is considered valid and appropriate for subsequent hypothesis testing.

Multiple Linear Regression Analysis Results

Table 9. Multiple Linear Regression Analysis Results (Coefficients)

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4207.580	349.597		12.036	.000		
	TARIF IJEPA	-1.229	77.093	-.002	-.016	.987	.964	1.038
	MHLW	10.574	75.108	.019	.141	.889	.964	1.038

a. Dependent Variable: Export Volume

Multiple linear regression analysis was employed to examine the effects of the Utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) Tariff Preferences (X_1) and Sanitary Restrictions Imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) (X_2) on the Export Volume of Indonesian Processed Tuna to Japan (Y). The estimated regression equation is expressed as: $Y = 4207{,}580 - 1{,}229X_1 + 10{,}574X_2 + e$. The constant value of 4,207.580 represents the baseline export volume when all independent variables are assumed to remain constant. The regression coefficient of X_1 (-1.229) indicates that an increase in tariff rates or a decline in the utilization of IJEPA tariff preferences is associated with a decrease of 1.229 units in the export volume of Indonesian processed tuna, ceteris paribus. This finding is consistent with international trade theory, which suggests that higher trade barriers reduce export performance. Meanwhile, the regression coefficient of X_2 (10.574) indicates a positive relationship between MHLW sanitary restrictions and export volume. This positive association may reflect an increase in the frequency of shipment rejections during periods when export shipments also increased (Kristiani et al., 2024). However, because the significance value is 0.889 ($p > 0.05$), the effect of MHLW sanitary restrictions is not statistically significant. Therefore, this relationship cannot be interpreted as having a significant effect on the export volume of Indonesian processed tuna to Japan.

Hypothesis Testing Results

Partial Significance Test (t-Test)

Table 10. Partial Significance Test (t-Test) Results (Coefficients))

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4207.580	349.597		12.036	.000		
	TARIF IJEPA	-1.229	77.093	-.002	-.016	.987	.964	1.038
	MHLW	10.574	75.108	.019	.141	.889	.964	1.038
a. Dependent Variable: Export Volume								

The partial significance test (t-test) was conducted to examine the individual effect of each independent variable on the export volume of Indonesian processed tuna to Japan by comparing the significance values with a 5% significance level. The results indicate that the Utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) Tariff Preferences (X_1) has a t-value of −0.016 with a significance value of 0.987 ($p > 0.05$). Therefore, this variable does not have a statistically significant effect on export volume, and the alternative hypothesis is rejected. Likewise, the Sanitary Restrictions Imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) (X_2) do not have a statistically significant effect, as indicated by a t-value of 0.141 and a significance value of 0.889 ($p > 0.05$). Consequently, the alternative hypothesis is also rejected. These findings suggest that neither the utilization of IJEPA tariff preferences nor MHLW sanitary restrictions has a significant partial effect on changes in the export volume of Indonesian processed tuna to Japan. Accordingly, product rejection cases appear to be incidental rather than systemic in nature (Kristiani et al., 2024).

Simultaneous Significance Test (F-Test)

Table 11. Simultaneous Significance Test (F-Test) Results (ANOVA)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27411.520	2	13705.760	.010	.990[b]
	Residual	78345110.663	57	1374475.626		
	Total	78372522.183	59			
a. Dependent Variable: Export Volume						
b. Predictors: (Constant), MHLW, TARIF IJEPA						

The simultaneous significance test (F-test) was conducted to examine whether the Utilization of IJEPA Tariff Preferences and MHLW Sanitary Restrictions jointly affected the export volume of Indonesian processed tuna to Japan. As shown in Table 11, the F-statistic is 0.010 with a significance value of 0.990 (> 0.05), indicating that the two independent variables do not simultaneously have a statistically significant effect on export volume. This finding is consistent with the Non-Tariff Barriers (NTBs) theory, which suggests that export performance in developed-country markets is

more strongly influenced by broader macroeconomic conditions and international logistics efficiency than by tariff preferences or customs regulations alone.

Coefficient of Determination (Adjusted R^2)

Tabel 12. Determination Coefficient Results (Model Summary)

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.019[a]	.000	-.035	1172.38032	2.399
a. Predictors: (Constant), MHLW, TARIF IJEPA					
b. Dependent Variable: Export Volume					

The coefficient of determination was used to measure the proportion of variation in the dependent variable explained by the regression model, with the Adjusted R Square serving as the primary measure because the model includes multiple independent variables. As presented in Table 12, the Adjusted R Square value is −0.035, which is conventionally interpreted as zero in econometric analysis. This result indicates that the utilization of IJEPA tariff preferences and MHLW sanitary restrictions did not explain the variation in the export volume of Indonesian processed tuna to Japan. Therefore, changes in export volume were more likely influenced by other external factors not included in the model, such as macroeconomic conditions, international market dynamics, supply chain disruptions, and logistical constraints within the fisheries sector.

2. Discussion

The findings of this study answer the research question by demonstrating that the utilization of the Indonesia–Japan Economic Partnership Agreement (IJEPA) tariff preferences and the sanitary restrictions imposed by Japan's Ministry of Health, Labour and Welfare (MHLW), both individually and simultaneously, did not have a statistically significant effect on the export volume of Indonesian processed tuna to Japan during the 2020–2024 observation period. This conclusion is supported by the multiple linear regression results, in which both independent variables produced significance values greater than 0.05, while the simultaneous test was also statistically insignificant. Furthermore, the Adjusted R^2 value was close to zero, indicating that the proposed model explained only a negligible proportion of the variation in export volume. These findings suggest that the monthly fluctuations in Indonesia's processed tuna exports were not primarily explained by tariff preferences or recorded sanitary rejection cases but were likely influenced by other determinants outside the regression model (Keil, 2023; Hartanto et al., 2021; Silva et al., 2023).

The insignificant effect of IJEPA tariff preferences indicates that preferential market access alone was insufficient to increase the export volume of Indonesian processed tuna. Although tariff reductions theoretically improve price competitiveness, exporters may obtain limited benefits when domestic structural constraints, including

logistics efficiency, production capacity, administrative readiness, and supply-chain performance, remain unresolved (Perdamayan, 2023; Permata & Handoyo, 2019). Consequently, tariff liberalization should be viewed as one component of export competitiveness rather than a sufficient condition for export growth. This interpretation is consistent with previous studies emphasizing that export performance is simultaneously influenced by institutional quality, competitiveness, production capability, logistics, and market demand rather than tariff incentives alone.

Similarly, the insignificant effect of MHLW sanitary restrictions should not be interpreted as evidence that food safety regulations are unimportant. Instead, it suggests that the monthly number of officially recorded shipment rejection cases did not significantly explain aggregate export volume during the observation period. Sanitary regulations may still affect exporters through compliance costs, certification requirements, quality assurance systems, and shipment-level risks, even though these impacts were not statistically detected in the present model. Therefore, the absence of statistical significance in this study reflects the characteristics of the empirical model rather than the absence of regulatory influence on international seafood trade. This interpretation is consistent with studies highlighting the importance of product quality, food safety systems, and compliance capacity in sustaining the competitiveness of Indonesian processed tuna exports (Sandaruwan et al., 2020).

The findings also indicate that export competitiveness is more likely to be determined by structural factors beyond tariff preferences and sanitary enforcement alone. Previous studies have shown that the competitiveness of Indonesian processed tuna depends on comparative advantage, market demand, production continuity, cold-chain management, logistics performance, and firms' ability to satisfy international quality standards. Within the Blue Economy perspective, sustainable fisheries management, effective post-harvest handling, traceability, and compliance with internationally recognized food safety systems such as Hazard Analysis and Critical Control Point (HACCP) are essential for strengthening long-term export competitiveness. These factors contribute not only to maintaining market access but also to improving product quality and consumer confidence in international markets (Nurkhasanah, 2026).

Nevertheless, the present findings differ from several previous studies that reported significant relationships between tariff or sanitary policies and export performance. Sanitary and Phytosanitary (SPS) measures significantly influenced Indonesian processed tuna exports across multiple destination countries, while tariff policies exhibited a negative but statistically insignificant relationship. Differences between those findings and the present study may be explained by variations in research design, geographical scope, observation period, and measurement of sanitary regulations (Silva et al., 2023). The previous study employed a cross-sectional gravity model involving multiple export destinations, whereas the present study focused

exclusively on Japan using monthly time-series data and represented sanitary regulations by officially recorded MHLW rejection cases. Such methodological differences may account for the different empirical outcomes observed.

Overall, these findings imply that enhancing Indonesia's processed tuna exports requires policy measures extending beyond preferential tariff agreements. Improving logistics efficiency, strengthening cold-chain infrastructure, enhancing food safety management, increasing production consistency, and reinforcing institutional capacity within Fish Processing Units (FPUs) are likely to contribute more substantially to sustainable export competitiveness (Posundu et al., 2024; Pratiwi et al., 2021). From a theoretical perspective, this study extends international trade literature by demonstrating that preferential tariff schemes and sanitary regulations should be understood within a broader framework of competitiveness that integrates production capability, institutional readiness, and the principles of the Blue Economy rather than being interpreted as of export performance.

D. Conclusions

This study investigated the effects of the utilization of Indonesia–Japan Economic Partnership Agreement (IJEPA) tariff preferences and the sanitary restrictions imposed by Japan's Ministry of Health, Labour and Welfare (MHLW) on the export volume of Indonesian processed tuna to Japan during the 2020–2024 period. The empirical findings indicate that neither the utilization of IJEPA tariff preferences nor MHLW sanitary regulations had a statistically significant effect on export volume, either individually or simultaneously. Furthermore, the regression model demonstrated very limited explanatory power, suggesting that the variation in Indonesia's processed tuna exports was not adequately explained by the two variables examined. These findings imply that preferential tariff access and recorded sanitary rejection cases alone are insufficient to explain the dynamics of processed tuna exports, while other structural, operational, and market-related factors may play a more important role. From a practical perspective, the findings suggest that strengthening Indonesia's export competitiveness requires policy measures that extend beyond preferential trade agreements. Greater attention should be directed toward improving fisheries governance, logistics efficiency, cold-chain infrastructure, production continuity, and compliance with internationally recognized food safety standards, including the Hazard Analysis and Critical Control Point (HACCP) system. Consistent implementation of Blue Economy principles through sustainable fisheries management, quality assurance, traceability, and efficient resource utilization may further enhance the long-term competitiveness of Indonesian processed tuna in international markets. Therefore, trade facilitation policies should be complemented by continuous improvements in domestic production systems and institutional capacity to maximize the benefits of international market access. This study has several limitations, including its focus on a single export destination, one commodity classification (HS Code 1604.14), and a relatively short observation period

consisting of 60 monthly observations. In addition, the model included only two explanatory variables, whereas export performance is likely influenced by broader macroeconomic, industrial, and market conditions. Future research is therefore recommended to incorporate additional determinants such as exchange rates, freight costs, production capacity, Japanese import demand, global tuna prices, institutional quality, and supply-chain performance. Comparative studies involving multiple export destinations and longer time-series or panel datasets are also encouraged to provide a more comprehensive understanding of the effectiveness of preferential trade agreements and non-tariff measures in supporting the sustainable development of Indonesia's fisheries exports.

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