Research Article

Analysis Of Competitiveness and Determinants of Indonesia's Fishery Exports in the International Market for the Period 2018–2022

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Abstract: Indonesia ranks second as the world's largest fishery-producing country. However, this potential contrasts with the relatively small and stagnant contribution of fishery exports to the GDP each year when compared to other export commodities in the agricultural sector. This study aims to determine the export competitiveness of fisheries and the effect of Indonesia's GDP, the GDP of destination countries, Indonesia's population growth rate, the population growth rate of destination countries, and economic distance simultaneously and partially on the value of Indonesia's fishery exports to 20 destination countries. This research uses panel data, consisting of cross-section and time series data for the period 2018–2022. The data analysis technique employs panel data regression with the assistance of the Eviews-12 analysis tool. The results show that Indonesia's GDP, the GDP of destination countries, Indonesia's population growth rate, the population growth rate of destination countries, and economic distance simultaneously have an effect on Indonesia's fishery exports. The population growth rate of destination countries has no effect on fishery exports, while economic distance has a significant negative effect on Indonesia's fishery exports.

Keywords: Agricultural exports; Competitiveness; Export; Fishery; International trade

1. INTRODUCTION

National development is a process of building a state system to achieve the objectives stated in the Preamble to the 1945 Constitution of the Republic of Indonesia, where its success is measured by economic growth as the main indicator (Widyastuti, 2021). Economic growth reflects the increase in the production of goods and services that drives the rise of real national income and the welfare of society. The agricultural sector, particularly the fishery sub-sector, plays a strategic role in supporting Indonesia's economy, considering that two-thirds of its territory consists of waters with a fishing area of around 5.8 million km² divided into 11 fishery management regions (BPS, 2021). According to Mardiyani (2020), the fishery sector not only contributes to food supply and employment but also plays an important role in trade, recreation, and improving the welfare of communities living around fishery resources.
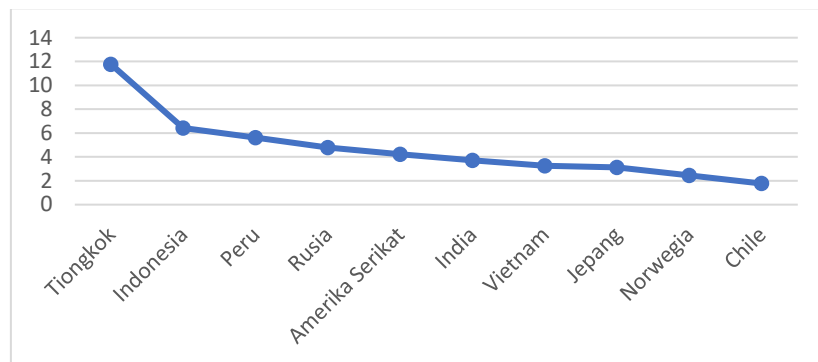
Chart 1. World Fishery Product Producing Countries (Million Tons). Source: Processed Data (Food and Agriculture Organization, 2022)

Based on the data of the world's fishery product-producing countries, it can be seen that in 2022, Indonesia ranked second as the world's largest producer of fishery products after China. When compared to Japan and India, which are known for their fishery products, Indonesia's fishery production remains quite high, amounting to 6.43 million tons, while Japan produced 3.13 million tons and India 3.71 million tons (FAO, 2022). This indicates that Indonesia's opportunities in fishery sector activities can support food security both nationally and globally. To ensure the sustainability of the fishery sector, proper management and responsibility are required, as it represents a major capital for Indonesia's economic development both in the present and the future. In accordance with Law Number 45 of 2009, Article 6 Paragraph 1 concerning Fisheries, fishery management within the Fisheries Management Areas of the Republic of Indonesia (WPPNRI) is carried out to achieve optimal and sustainable benefits while ensuring the preservation of fish resources (Widyastuti, 2021). The following presents the data on the contribution of each sub-sector to Indonesia's GDP from 2019 to 2022.

Table 1. Contribution of Business Fields by Sector to Indonesia's GDP (Percent).

Business Field	2019	2020	2021	2022	Average
Agriculture, Forestry, and Fisheries	12.71	13.7	13.28	12.4	13.02
a. Agriculture, Livestock, Hunting and Agricultural Services	9.4	10.2	9.85	9.22	9.67
Crops	2.82	3.07	2.87	2.73	2.87
Horticultural Plants	1.51	1.62	1.53	1.44	1.53
Plantation Crops	3.27	3.36	3.23	3.1	3.24
Farm	1.62	1.69	1.58	1.52	1.6
Agricultural and Hunting Services	0.19	0.16	0.15	0.18	0.17
b. Forestry and Logging	0.66	0.7	0.67	0.65	0.67
c. Fisheries	2.65	2.63	2.76	2.58	2.65
Mining and Quarrying	7.26	6.47	8.97	8.72	8.35
Processing industry	19.7	19.87	19.84	19.83	19.81
Electricity and Gas Procurement	1.27	1.29	1.28	1.29	1.28
Water Supply, Waste Management, Waste and Recycling	0.07	0.07	0.07	0.06	0.07
Construction	10.75	10:47	10:46	10:47	10.54
Wholesale and Retail Trade; Automobile and Motorcycle Repair	13.01	12.91	12.96	12.85	12.93
Transportation and Warehousing	5.57	5.28	5.43	5.41	5.42
Provision of Accommodation and Food and Beverages	2.78	2.55	2.43	2.41	2.54
Information and Communication	5.37	5.42	5.44	5.43	5.41
Financial Services and Insurance	4.24	4.51	4.34	4.13	4.31
Real Estate	2.42	2.41	2.36	2.35	2.38

Corporate Services	1.92	1.91	1.77	1.74	1.84
Government Administration, Defense and Compulsory Social Security	3.61	3.79	3.66	3.57	3.66
Educational Services	3.36	3.42	3.39	3.34	3.38
Health Services and Social Activities	1.9	1.96	1.94	1.91	1.93
Other services	1.95	1.96	1.84	1.81	1.89
GROSS DOMESTIC PRODUCT	**100**	**100**	**100**	**100**	**100**

Source: Central Bureau of Statistics of Indonesia, 2023

Based on Table 1, it can be seen that the structure of Indonesia's economy by business field did not change significantly during the 2019–2022 period. The broad agricultural sector (including forestry and fisheries) ranks second with an average annual contribution of 13.02% to Indonesia's GDP, with the narrower agricultural sector contributing 9.67%. Upon closer observation, the fishery business field contributed an average of only 2.70% per year. Meanwhile, the manufacturing industry consistently provided the highest contribution each year, with an average of 19.29%. The wholesale and retail trade, as well as motor vehicle and motorcycle repair business field, ranked third with an average contribution of 12.93%. These figures are quite surprising given that Indonesia's territory consists of two-thirds ocean and a land area of 1.9 million km², earning it the title of a maritime nation. This should make fisheries one of the sub-sectors with high potential to help boost Indonesia's economy. Figure 2 below shows the contribution of the fishery sub-sector to Indonesia's GDP from 2012 to 2022.
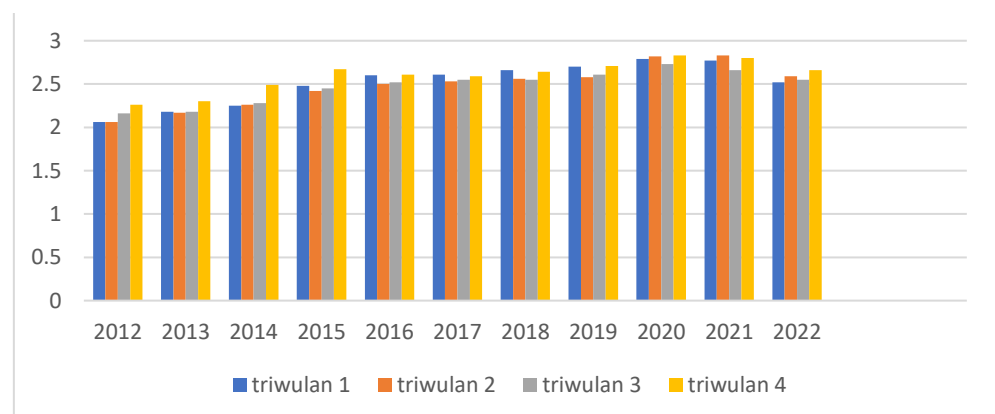

Chart 2. Contribution of the Fishery Sector to Indonesia's GDP (Percent). Source: Indonesian Ministry of Maritime Affairs and Fisheries, 2024

Yulistia and Rahayu (2022) stated that the fishery sector holds a strategic role in national development due to Indonesia's vast marine area, large and diverse economic potential, and its connection to various industrial activities. The renewable nature of marine resources positions this sector as the foundation of sustainable economic development, while Indonesia's open economic system makes exports a key driver of economic growth and a major source of foreign exchange (Ikaningtyas et al., 2023). Indonesia is among the world's top ten countries in terms of fishery export value, reaching its peak in 2020 at USD 5.2 billion, signifying a substantial contribution to both community welfare and the national economy (BPS, 2021). According to Ali Mursit and Wahyono (2022), commodities such as shrimp, tuna, grouper, and seaweed are processed into various fishery products fresh, frozen, and processed strengthening the fishery sub-sector's role as a significant contributor to Indonesia's GDP.
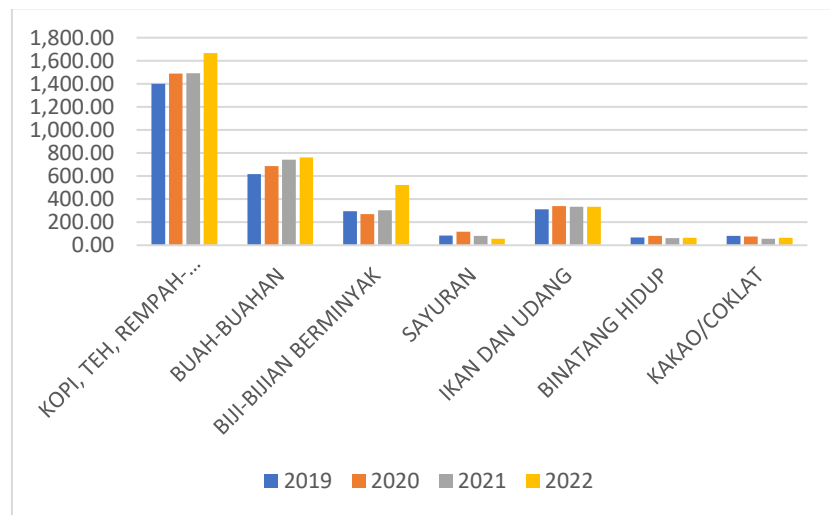
Chart 3. Contribution of Agricultural Sector Export Value to Indonesia's GDP (Percent).
Source: Ministry of Trade of Indonesia, 2024

Based on Figure 3, the sub-sector of coffee, tea, and spices made the largest contribution to Indonesia's GDP, amounting to USD 1,666.9 million in 2022 far surpassing other sub-sectors such as fruits, fisheries, and oilseeds. Meanwhile, the fishery sub-sector's value remained relatively stagnant, peaking at USD 338 million in 2020, despite Indonesia's vast marine area. According to Putri (2018), Indonesia's large capture fishery potential has not been fully utilized, positioning the country as the second-largest tuna producer in ASEAN after Thailand. Therefore, the marine and fishery sector must be prioritized in national development to stimulate economic growth.
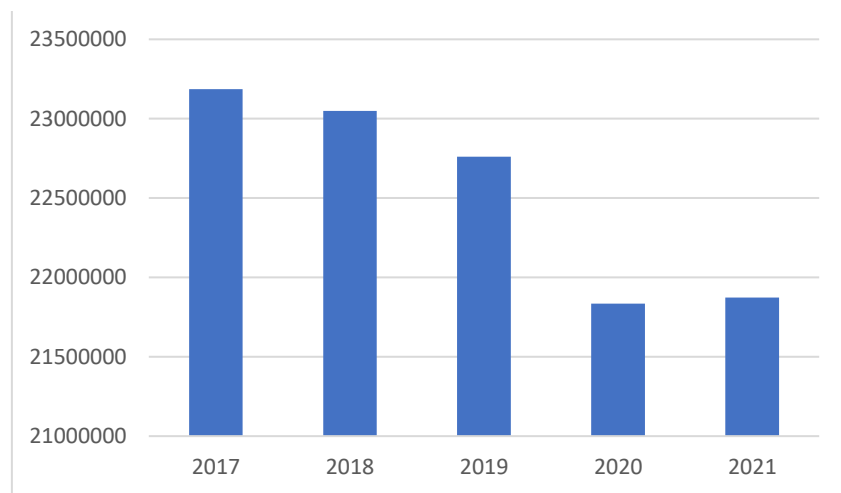

Chart 4. Total Fishery Production Volume in Indonesia (Tons).
Source: Ministry of Maritime Affairs and Fisheries of Indonesia, 2024

Based on Figure 4, Indonesia's fishery production volume declined during 2017–2020, from 23.18 million tons in 2017 to 21.83 million tons in 2020, mainly due to the impact of the COVID-19 pandemic, which limited fishing activities (KKP, 2023). Other influencing factors include the number of fishermen and fleet capacity, where an increase in labor and vessel capacity correlates positively with catch yields. According to Lukman Adam (2018), Indonesia's lower fishery productivity compared to countries such as China is caused by limited technology and outdated fleets, even though technology plays a crucial role in improving efficiency and competitiveness. This is supported by Alamsyah (2023), who stated that countries with higher GDPs tend to have greater capacity to adopt modern fishery technologies, while Indonesia still lags behind China and Thailand. Furthermore, tariff and non-tariff barriers, rising fuel prices, extreme weather conditions, and the dominance of small-scale fishermen are the main

challenges hindering the stability of Indonesia's fishery production and exports (KKP, 2020).

Table 2. Total Volume of Indonesian Fishery Exports and Imports (Tons).

Year	Total Imports	Total Exports
2018	273,728.14	1,125,242.38
2019	249,839.21	1,184,171.69
2020	256,864.57	1,262,829.69
2021	249,953.34	1,221,904.61
2022	342,746.88	1,224,059.69

Source: Ministry of Maritime Affairs and Fisheries, 2024

Based on Table 2, it can be seen that Indonesia's fishery export volume increased from 1,125,242.38 tons in 2018 to a peak of 1,262,829.69 tons in 2020. This figure then slightly decreased to 1,221,904.61 tons in 2021. The decline was not too significant considering that Indonesia was still recovering from the COVID-19 pandemic at that time. However, another concern arises when the increase in exports is also followed by a rise in fishery imports. According to Table 2, Indonesia's fishery import volume also increased. Although Indonesia experienced a trade surplus up to 2020, this situation raises concerns that a continuous trend could eventually lead to a trade balance deficit (KKP, 2024).

Despite this condition, Indonesia still recorded a surplus, but if the situation persists, there are concerns that a trade balance deficit may occur. Therefore, the objective of this study is to determine how to increase Indonesia's export share by estimating the factors that drive Indonesia's export performance with its trading partner countries. Rizki (2018) stated that there are two determinants of export demand. In his study, which used a modified gravity model, the variables commonly used in international economics, particularly in international trade, were applied. In this model, mass is represented by GDP, while distance represents the space between two countries. Martinez (2015) argued that higher income levels in exporting countries indicate higher production levels, which in turn increase the volume of goods exported. The GDP of the exporting country measures its production capacity, while the GDP of the importing country measures its economic capacity. Real GDP reflects the size of a country's economy; therefore, if a country's GDP increases, it tends to export or import in greater quantities, which has implications for growing trade activity. In the gravity model approach, GDP serves as a measure of a country's ability to produce goods and services within a given year.

Based on the above explanation, it can be concluded that Indonesia possesses significant potential in international trade, particularly in the fishery sub-sector. Considering that the prospects for fishery exports in the international market remain promising and can contribute to Indonesia's GDP growth, this study aims to provide empirical evidence on the competitiveness and factors affecting Indonesia's fishery exports in the international market using the gravity model approach specifically analyzing the effect of Indonesia's GDP, destination countries' GDP, Indonesia's and destination countries' population growth rates, and the distance between Indonesia and 20 destination countries during the 2018–2022 period.

2. METHOD

This study employs a quantitative approach with an associative design to analyze the relationship between economic variables that affect the value of Indonesia's fishery exports to 20 main destination countries during the 2018–2022 period. The associative design allows the researcher to examine the effect among variables such as Indonesia's GDP, the GDP of destination countries, the population growth rate of both countries, and economic distance on the value of Indonesia's fishery exports. The data used are panel data, which combine cross-section and time series data, obtained from official sources such as FAO Stat, the World Bank, the International Trade Centre, UNCOMTRADE, Statistics Indonesia, the Ministry of Marine Affairs and Fisheries, and the Ministry of Trade. This approach was chosen because it provides a strong

empirical overview of the factors that affect the competitiveness of Indonesia's fishery exports in the global market (Marhaeni, 2019).

This study employs the dependent variable, namely the Value of Indonesia's Fishery Exports (Y), and five independent variables: Indonesia's GDP (X1), the GDP of Destination Countries (X2), Indonesia's Population Growth Rate (X3), the Population Growth Rate of Destination Countries (X4), and Economic Distance (X5). Data analysis was conducted using the Revealed Comparative Advantage (RCA) model to measure comparative advantage and the Trade Specialization Index (ISP) to observe the tendency of export or import of fishery commodities. Furthermore, the panel data regression model with the assistance of EViews 12 software was used to examine the effect of these variables. To determine the best model, Chow test, Hausman test, and Lagrange Multiplier test were conducted to select between the Common Effect, Fixed Effect, or Random Effect models (Mahulete, 2016).

To ensure model validity, classical assumption tests were performed, including normality, autocorrelation, multicollinearity, and heteroscedasticity tests. Furthermore, hypothesis testing was carried out using partial tests (t-test), simultaneous tests (F-test), and the coefficient of determination (R^2) to determine how much the independent variables could explain the dependent variable. The non-participant observation method was used in data collection, with the researcher acting as an independent observer of the available secondary data. The results of this series of analyses are expected to provide empirical contributions to understanding the economic factors that have an effect on Indonesia's fishery exports and to strengthen strategies for improving the competitiveness of the national fishery sector (Ghazali, 2011; Gujarati, 2012).

3.   RESULTS AND DISCUSSION
General Overview of the Research Area or Region
Geographical and Climatic Conditions

Indonesia, officially known as the Republic of Indonesia (NKRI), is located in Southeast Asia between the continents of Asia and Australia and is bordered by the Indian and Pacific Oceans. This position gives Indonesia a tropical climate and a strategic role in international trade. With more than 17,000 islands, a coastline stretching 54,716 km², and a sea area of 6.4 million km², Indonesia is the world's largest archipelagic country as well as a major producer of marine resources (KKP, 2024). Its waters, located at the confluence of two ocean currents, carry vital nutrients for marine ecosystems, while the monsoon wind pattern that alternates every six months affects fishery productivity (BRIN, 2018). Indonesia's sustainable capture fisheries potential reaches 12.54 million tons per year, with leading commodities such as tuna, skipjack, mackerel tuna, snapper, and grouper contributing significantly to the national economy through exports and related industries (KKP, 2024). However, geographical challenges such as population growth, inter-island distance, and limited infrastructure remain obstacles to the distribution of goods and services, which also affect Indonesia's fishery exports during the 2018–2022 period. Therefore, understanding geographical conditions, natural resources, and regional connectivity is crucial in analyzing the effect of GDP, population growth, and economic distance on Indonesia's fishery exports during this period.

Data Description Related to Research Variables

Table 3. Descriptive Statistics of Research Variables.

	Y	X1	X2	X3	X4	X5
Mean	236,906.31	1,145,206,384,636.31	3,139,096,514,452.44	1.26	0.5922	11,950.6
Median	67,164.51	1,119,099,871,350.20	1,193,350,192,580.44	1.25	0.47	5,563.0
Maximum	2,532,864.43	1,319,100,220,407.72	25,439,700,000,000.00	1.33	3.31	52,838
Minimum	338.57	1,042,271,532,988.63	12,005,799,653.98	1.17	-4.17	0.279
Standard Deviation	493,445.20	10,114,885,649.00	12,005,799,653.00	0.058	0.56042	0.55486111
N	100	100	100	100	100	100

Source: Processed by the author

Based on Table 3, the development of each research variable experienced changes during the 2018–2022 period, which will be discussed in detail in the following sub-sections.

Development of Indonesia's Fishery Exports

Indonesia is one of the world's largest fishery producers and exporters, with this sector making a significant contribution to the national economy. During the 2018–2022 period, the development of fishery exports was influenced by global market conditions, government policies, and infrastructure improvements, including port development and the provision of fishing fleet assistance to fishermen. The average value of Indonesia's fishery exports reached 236,906.31 million US$, peaking at 2,532,864.43 million US$ due to high demand from the United States, China, Japan, and Southeast Asian countries. The COVID-19 pandemic temporarily reduced global demand in 2020 but recovered in 2021 as the global economy improved. Despite facing challenges such as price fluctuations, climate change, and international competition, Indonesia managed to maintain its position as a major exporter thanks to government policy support and adaptation to global market dynamics (Oka, 2024).

Development of Population Growth Rate

The population growth rate is the change in population within a certain period, usually expressed as a percentage per year and influenced by factors such as birth, death, and migration (Utami, 2019). High population growth can increase labor availability and encourage production, including in export sectors such as agriculture, fisheries, and manufacturing. Conversely, countries with low population growth tend to rely on exports to utilize production surpluses resulting from declining domestic consumption. To maintain resource sustainability, the Indonesian government implements fishing quotas to prevent overfishing and ensure long-term export stability (Idris, 2023). At the beginning of the decade, major countries such as the United States experienced a slowdown in population growth of around 0.5% per year, while other countries such as Egypt, Thailand, and China showed significant slowdowns, even negative growth in Japan and Russia, with a sharp decline in 2020–2021 due to the impact of the COVID-19 pandemic.

Development of Economic Distance

Economic distance between countries is a concept that describes how close or distant economic interactions are between two economic entities within the context of globalization and international trade. This concept not only includes geographical aspects but also considers factors such as trade policies, market integration, foreign direct investment (FDI), and interdependence in global supply chains. The growth and changes in economic distance between Indonesia and the 20 destination countries from 2018 to 2022 reflect complex dynamics in global economic relations (Rini, 2020).

Statistical Results
Competitiveness Test Results
a. Revealed Comparative Advantage (RCA)

Table 4 Results of Competitiveness Test Using RCA.

Country	2018	2019	2020	2021	2022	Average
Japan	60.78	65.23	35.35	61.59	75.7	59.73
France	38.58	23.73	20.98	26.17	29.71	27.83
Australia	11.41	13.15	12.88	13.23	15.94	13.32
South Korea	14.05	18.04	11.12	15.01	19.47	15.54
Malaysia	30.65	34.59	33.73	36.85	37.56	34.68
Saudi Arabia	26.03	26.74	17.76	25.18	28.06	24.75
Singapore	32.59	34.39	26.47	31.3	35.21	31.99
United States of America	76.1	84.62	63.48	76.74	88.94	77.98
Vietnamese	34.57	37.06	27.82	36.55	38.43	34.89
Thailand	41.93	42.39	40.85	55.91	58.42	47.90
Denmark	34.74	21.56	15.71	17.46	24.73	22.84
Dutch	27.13	22.21	12.43	21.37	29.63	22.55
Spanish	22.53	22.72	14.88	21.56	27.41	21.82
Egypt	19.76	21.87	15.05	23.56	24.69	20.99
Belgians	24.42	28.81	15.27	22.12	24.17	22.96

German	20.97	22.85	15.28	17.04	24.87	20.20
Brunei Darussalam	19.78	22.4	13.04	18.32	23.47	19.40
Canada	12.04	14.22	8.98	12.59	16.93	12.95
China	44.11	48.93	35.33	43.81	48.39	44.11
Russia	12.39	18.72	8.99	16.1	19.56	15.15

Source: World Bank, 2024 (Processed Data)

Based on Table 4, during the 2018–2022 period, Indonesia had a comparative advantage in fishery exports, supported by production quality, competitive costs, and strong global demand. This competitiveness was greatly influenced by economic growth in major countries such as the United States, Japan, China, and ASEAN countries, although fluctuations in commodity prices, export policies, and developments in renewable energy technologies also affected the demand for Indonesian fishery products (Oka, 2024).

b. Trade Specialization Index (ISP)

Table 5. Results of Competitiveness Test Using ISP.

Year	ISP Value
2018	0.76
2019	0.88
2020	0.89
2021	0.91
2022	0.94
Average	**0.87**

Source: Ministry of Trade, 2024 (Processed Data)

Based on Table 5, the ISP value of Indonesia's fishery exports from 2018 to 2022 remained relatively stable, ranging from 0.76 to 0.94, with an average of 0.87. This indicates that Indonesia's fishery commodities have strong competitiveness in international trade, and Indonesia can be classified as a global fishery-exporting country.

Panel Data Selection

Table 6. Results of Multiple Regression Test on the Effect of Indonesia's GDP, Destination Country GDP, Indonesia's Population Growth Rate, Destination Country Population Growth Rate, and Economic Distance on Indonesia's Fishery Exports (2018–2022) Using Common Effect Model.

Variables	Coefficient	Std.Error	t-Statistic	Prob.
C	-125956.9	376924.1	-0.33417	0.7390
X1	-7.78E-09	1.93E-07	4.02972	0.672
X2	1.00E-07	3.58E-09	2,794,933	0.0000
X3	0.000465	0.001848	0.251466	0.0802
X4	-0.000479	6.42E-05	7.462679	0.7102
X5	-0.108024	1.187415	0.090974	0.9277
R-squared	0.922436		-statistic	223.5803
Adjusted R-squared	0.918310		Prob (F-statistic	0.000000

Source: Processed by the author

Based on Table 6, statistically, the common effect model that examines the influence of Indonesia's GDP, destination country GDP, Indonesia's population growth rate, destination country population growth rate, and economic distance on Indonesia's fishery exports during 2018–2022 is valid, with an F-statistic value of 223.5803 and a probability of 0.000000. The variables that significantly influence fishery exports are Indonesia's GDP, destination country GDP, and Indonesia's population growth rate, each having probability values below 0.05. Subsequently, further testing is conducted to determine the best model that fits the research data.

1) Chow Test

Table 7. Results of Chow Test Using Fixed Effect Model on the Effect of Indonesia's GDP, Destination Country GDP, Indonesia's Population Growth Rate, Destination Country Population Growth Rate, and Economic Distance on Indonesia's Fishery Exports (2018–2022).

Redundant Fixed Effects Tests
Equation: Untitled
Cross-section fixed effects test

Effects Test	Statistics	f.	Prob.
Cross-section F	27.352849	19.75)	.0000
Cross-section Chi-square	207.057591	9	.0000

Source: Processed by the author

Based on Table 7, the results show a P-Value = 0.0000 (less than 5%), indicating that H_0 is rejected, meaning the Fixed Effect Model is better than the Common Effect Model.

Therefore, further testing is required to determine whether the Fixed Effect or Random Effect model is statistically more appropriate, which will be evaluated through the Hausman Test.

2) Hausman test

Table 8. Results of Hausman Test Using Random Effect Model on the Effect of Indonesia's GDP, Destination Country GDP, Indonesia's Population Growth Rate, Destination Country Population Growth Rate, and Economic Distance on Indonesia's Fishery Exports (2018–2022).

Correlated Random Effects - Hausman Test
Equation: Untitled
Cross-section random effects test

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
Random cross-section	17.24701 5 0.0017	5	0.0017

Source: Processed by the author

Based on Table 8, the p-value = 0.0017 (less than 5%), leading to the decision to reject H_0, which means the Fixed Effect Model is statistically better than the Random Effect Model. Therefore, the subsequent analysis will focus solely on the results from the Fixed Effect Model.

Panel Data Regression Analysis

Table 9. Results of Multiple Regression Tests using the Fixed Effect Model.

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	-2357833.	927862.2	-2.541146	0.0131
X1	5.039406	7.981557	0.631381	0.0052
X2	5.883841	1.356283	4.338210	0.0000
X3	0.000315	0.000803	0.393094	0.0069
X4	-0.017628	0.007415	-2.377471	0.6904
X5	-4.566662	3.906107	1.169108	0.0002
R-squared	0.799021		F-statistic	316.3443
Adjusted R-squared	0.681465		Prob (F-statistic)	0.000000

Source: Processed by the author

Notes:
Y = Fishery Exports (million USD)
X1 = Indonesia's GDP (million USD)
X2 = Destination Country GDP (million USD)
X3 = Indonesia's Population Growth Rate (%)
X4 = Destination Country Population Growth Rate (%)
X5 = Economic Distance (km)
Based on the regression results above, the model can be expressed as follows:

Y=-2357833+5.039406*X1+5.883841*X2+0.000315*X3-0.017628*X4-4.566662*X5…………………………………………………………….…..(4.1)

Where:

Y_{it} = Value of Fishery Exports

α   =Constant

β   =Regression coefficient of each independent variable

X_1 =Indonesia's GDP

X_2 = Destination Country GDP

X_3 =Indonesia's Population Growth Rate

X_4 =Destination Country Population Growth Rate

X5 = Economic Distance

i   =Destination Country (i = 20)

t   =Year Period (2018-2022)

eit = Disturbance (error) variable

Classical Assumption Test

This test aims to determine whether the regression model is free from classical assumption violations, ensuring its suitability for making predictions. In this study, the tests conducted are: 1) Multicollinearity Test, and 2) Heteroskedasticity Test.

1) Multicollinearity Test

Table 10. Correlation Matrix Among Independent Variables.

X1	X2	X3	X4	X5
1,000,000	0.037102	0.687087	0.001591	-0.006317
0.037102	1,000,000	0.026302	0.682553	-0.358112
0.687087	0.026302	1,000,000	0.001891	-0.001558
0.001591	0.682553	0.001891	1,000,000	-0.269020
-0.006317	-0.358112	-0.001558	-0.269020	1,000,000

Source: Processed by the author

Notes:

X1: Indonesia's GDP (Million USD)

X2: Destination Country GDP (Million USD)

X3: Indonesia's Population Growth Rate (%)

X4: Destination Country Population Growth Rate (%)

X5: Economic Distance (Km).

Based on Table 10, the correlation coefficients among the independent variables Indonesia's GDP, Destination Country GDP, Indonesia's Population Growth Rate, Destination Country Population Growth Rate, and Economic Distance are all below 0.85. This indicates that the regression model and the five independent variables in this study do not exhibit multicollinearity symptoms.

2) Heteroscedasticity Test

Table 11. Heteroskedasticity Test Results Using Glejser Method

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	150565.3	546646.3	0.275435	0.7837
X1	3.45E-08	4.70E-08	0.734484	0.4649
X2	9.11E-09	7.99E-09	1.139481	0.2581
X3	0.000266	0.000473	0.562908	0.5752
X4	-0.01927	0.004369	-0.441167	0.6604
X5	-0.540168	2.301267	-0.234726	0.8151
R-squared	0.554182		F-statistic	3.884593
Adjusted R-squared	0.411521		Prob (F-statistic)	0.352478

Source: Processed by the author

Based on the heteroskedasticity test with an F-value of 3.884593 and a probability of 0.352, the model is declared free from heteroskedasticity because all independent variables have probabilities above 0.05. The results in Table 11 show that GDP

Indonesia (X1) and GDP Destination Country (X2) have positive and significant effects on Indonesian fisheries exports, with coefficients of 5.039406 and 5.883841 ($p < 0.01$), respectively. The population growth rate of Indonesia (X3) also has a positive and significant effect with a coefficient of 0.000315 ($p < 0.01$), while the population growth rate of the destination country (X4) has a negative but insignificant effect ($p = 0.6904$). Meanwhile, economic distance (X5) shows a negative and significant effect with a coefficient of -4.566662 ($p < 0.01$), indicating that the greater the economic distance, the lower the volume of Indonesian fisheries exports. The coefficient of determination (R^2) of 0.7990 indicates that 79.90% of the variation in Indonesian fisheries exports is explained by these five independent variables, while the remaining 20.10% is influenced by other factors outside the model.

Simultaneous Effect Test of GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance on Indonesian Fisheries Exports.

Table 12. F-Test Results for the Effect of GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance on Indonesian Fisheries Exports 2018-2022.

R-squared	0.799021
Adjusted R-squared	0.681465
SE of regression	56070.74
Sum squared residual	23579.60
Log likelihood	-1220.947
F-statistic	316.3443
Prob (F-statistic)	0.000000

Source: Processed by the author

Based on Table 12, the simultaneous test results show an F-count of 316.3443 > F-table 2.30 with a probability value of 0.0000 < 0.05, so it can be concluded that the variables GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance simultaneously affect the value of Indonesian Fisheries Exports for 2018-2022.

Based on Table 12, the R-Squared value of 0.7990 means that 79.90% of the variation in Indonesian Fisheries Exports in 2018-2022 is influenced by the variation of GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance, while the remaining 20.10% is influenced by other variables outside the model.

Partial Effect Test of GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance on Indonesian Fisheries Exports 2018-2022

Table 13. t-Test Results for the Effect of GDP Indonesia, GDP Destination Country, Population Growth Rate of Indonesia, Population Growth Rate of Destination Country, and Economic Distance on Indonesian Fisheries Exports 2018-2022.

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	-2357833.	927862.2	-2.541146	0.0131
X1	5.039406	7.981557	0.631381	0.0052
X2	5.883841	1.356283	4.338210	0.0000
X3	0.000315	0.000803	0.393094	0.0069
X4	-0.017628	0.007415	-2.377471	0.6904

Source: Processed by the author

Based on Table 13, the partial test (t-test) results indicate that GDP Indonesia, GDP Destination Country, and the population growth rate of Indonesia have positive effects on Indonesian fisheries exports. GDP Indonesia has a regression coefficient of 5.039406 with a probability of 0.0052 < 0.05, meaning that the higher Indonesia's GDP, the higher the fisheries exports. GDP Destination Country also has a positive and significant effect with a coefficient of 5.883841 and probability 0.000 < 0.05, indicating that an increase in the destination country's GDP boosts Indonesian fisheries exports.

Meanwhile, Indonesia's population growth rate has a positive and significant effect with a coefficient of 0.000315 and probability 0.0069 < 0.05, indicating that population growth encourages export increases. In contrast, the population growth rate of the destination country and economic distance have negative effects, with economic distance proven significant (p < 0.05), showing that the farther the destination country, the lower the value of Indonesian fisheries exports.

Discussion

The results of the study show that during the period 2018–2022, Indonesia had strong competitiveness in fisheries exports, with RCA values > 1, especially to the United States, Japan, and Thailand, supported by production quality, competitive costs, and high global demand. The ISP value for Indonesian fisheries also remained stable, with an average of 0.87, indicating a strong and competitive export position in the international market due to abundant natural resources, labor, and capital. Simultaneously, the variables of Indonesia's GDP, destination country's GDP, Indonesia's population growth rate, destination country's population growth rate, and economic distance significantly affected Indonesian fisheries exports (F-count 316.3443 > F-table 2.30; p < 0.05). Partially, Indonesia's GDP and the destination country's GDP had positive and significant effects, meaning that an increase in GDP boosts investment, technology, and production capacity, thereby increasing export volumes, in line with the studies of Herniati (2022) and Arif (2017). Meanwhile, Indonesia's population growth rate also positively affected exports because a larger population expands the labor force and production capacity. Conversely, the population growth rate of the destination country had a negative effect, as higher domestic production capability in the importing country reduces the need for imports from Indonesia. Lastly, economic distance had a negative and significant effect on fisheries exports, where greater trade distance increases transportation costs, logistic risks, and reduces product competitiveness, consistent with the findings of Jayasooriya (2021) and Azizah (2022).

4. CONCLUSION

Based on the results of the research conducted, it can be concluded that:
a. The competitiveness of Indonesian fisheries, measured using the RCA method, has a comparative advantage over other countries and has the potential to export to countries with large economic growth such as the United States, Japan, China, as well as ASEAN countries like Malaysia, Thailand, Singapore, and Vietnam. Using the ISP method, the competitiveness of Indonesian fisheries remains fairly stable with an average value close to 1, indicating strong competitiveness, or in other words, Indonesia can be classified as a global fisheries exporting country.
b. Indonesia's GDP, the destination country's GDP, Indonesia's population growth rate, and economic distance simultaneously affect the value of Indonesian fisheries exports. Meanwhile, the population growth rate of the destination country does not significantly affect the value of Indonesian fisheries exports.
c. Partially, Indonesia's GDP, the destination country's GDP, Indonesia's population growth rate, the destination country's population growth rate, and economic distance have a significant effect on the value of Indonesian fisheries exports.

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