

## THE EFFECTS OF TRADE FACILITATION ON INDONESIAN FISHERIES EXPORT

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**Abstract:** The growth in the volume and export value of fishery subsector shows the importance role of its sector to Indonesian economy. The export performance is influenced by many aspects, including trade facilitation. The problem faced by Indonesia is the low quality of trade facilitation resulting in relatively high trade costs, and this will affect the export performance. This research aims to analyze the effect of trade facilitation as well as other related variables on the Indonesia export in the fishery subsector, shrimp commodity exports, and export of tuna, mackerel tuna, as well as skipjack tuna. This study used panel data with ten years time series from 2007 to 2016, and the cross section data included ten major export destination countries. The data were analyzed using the gravity model with fixed effect estimation method. The study results showed that trade facilitation and other related variables had an effect on Indonesian fishery, shrimp, and tuna, mackerel tuna, as well as skipjack tuna exports. Based on the research results, Indonesian fishery exports can be improved by, firstly improving capacity and quality port infrastructure. Secondly, improving capacity and quality of electricity supply. Thirdly, the institutional quality is primarily concerned with ethics and corruption, and fourthly, the efficiency of trade across border needs to be improved in the hope of increasing the Indonesian export in the fishery subsector.

**Keywords:** export, fishery, gravity model, trade facilitation

**Abstrak:** Pertumbuhan volume dan nilai ekspor subsektor perikanan menunjukkan bahwa perikanan memiliki peranan penting dalam perekonomian Indonesia. Kinerja ekspor dipengaruhi oleh banyak aspek, termasuk fasilitasi perdagangan. Permasalahan yang dihadapi Indonesia adalah rendahnya kualitas fasilitasi perdagangan yang mengakibatkan biaya perdagangan relatif tinggi. Penelitian ini bertujuan untuk menganalisis pengaruh fasilitasi perdagangan serta variabel terkait lainnya terhadap ekspor perikanan, udang, dan tuna, tongkol, cakalang (TTC) Indonesia. Penelitian ini menggunakan data sekunder berupa data panel dengan time series sepuluh tahun (2007-2016) dan data cross section yaitu sepuluh negara tujuan utama. Dianalisis menggunakan model gravitasi dengan metode estimasi fixed effect. Hasil penelitian menunjukkan bahwa fasilitasi perdagangan dan variabel terkait lainnya berpengaruh pada ekspor perikanan, udang, dan TTC Indonesia. Berdasarkan hasil penelitian, ekspor perikanan Indonesia dapat ditingkatkan dengan peningkatan fasilitasi perdagangan terutama terkait dengan : pertama, peningkatan kapasitas dan perbaikan kualitas infrastruktur pelabuhan. Kedua, peningkatan kapasitas dan perbaikan kualitas supply listrik. Ketiga, peningkatan kualitas tata kelola pemerintahan, khususnya terkait dengan ethics and corruption, dan keempat peningkatan efisiensi perdagangan lintas batas.

**Kata kunci:** ekspor, perikanan, model gravitasi, fasilitasi perdagangan

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## INTRODUCTION

The development of the value and volume of fishery product exports shows the important role of the fisheries subsector in the Indonesian economy (Table 1). The value of fishery product exports for the period of 2007 to 2016 showed a growth of 5.30%. The export value of fishery products that experienced this growth was inversely proportional to the total value of Indonesia's exports during the same period which showed a downward trend.

According to KKP (2015), shrimp and tuna, mackerel tuna, as well as skipjack tuna were the main commodities of fisheries whose export volume and value showed an increasing trend from 2010 to 2014. Shrimp dominated by 39%; while tuna, mackerel tuna, as well as skipjack tuna commodities contributed 16% of the Indonesian fishery products for export.

The export of a country is not influenced only by the tariff and non-tariff aspects but also by many aspects (Portugal-Perez & Wilson, 2012). Export performance is also influenced by trade facilitation conditions which consist of infrastructure and institutional conditions. The problem is the limited trade facilitation. Indonesia's overall infrastructure quality ranked only 60th and institutional condition ranked 56th out of 138 countries studied (WEF, 2017).

Research on the influence of policies related to trade facilitation on trade flows has been carried out by several researchers. Trade facilitation conditions affect trade costs; therefore, the higher the trade costs, the higher the overall production costs. Ashari's research (2016) shows that Indonesia's shrimp competitiveness is lower than that of Thailand because Thailand extremely focused on improving the quality, efficiency and productivity. Apsari's (2011) study shows that the government policies such as simplifying business licenses, repairing ports and building adequate cold storage have positive and significant effects on Indonesian tuna production for export.

The length of time needed for export becomes a problem in the storage costs and quality of perishable (easily damaged/rotten) fishery products. The risk caused by poor trade facilitation, especially on perishable fishery products is very high, because for perishable goods, the possibility of the goods being undamaged on arrival is inversely proportional to the delivery time and also affects the storage costs, which will affect the overall production costs.

Therefore, studies on the effects of trade facilitation on exports, in this case, Indonesian fisheries exports and the export of the main fishery export commodities, namely, shrimp and tuna, mackerel tuna, as well as skipjack tuna are considered important to be conducted. Research on the influence of infrastructure and institutional variables on export performance with the Indonesian cases have not been widely conducted.

Table 1. The value and volume of Indonesian fishery exports in 2007-2016

Year	Export Value (US\$)	Growth (%)	Export Volume (kg)	Growth (%)
2007	2,102,855,303	-	708,824,698	-
2008	2,472,509,526	14.95	751,449,177	5.67
2009	2,248,982,635	(9.94)	735,889,098	(2.11)
2010	2,559,336,706	12.13	869,926,096	15.41
2011	3,182,963,127	19.59	922,476,612	5.70
2012	3,593,962,152	11.44	1,028,483,702	10.31
2013	3,845,358,579	6.54	1,034,640,484	0.60
2014	4,247,207,315	9.46	1,027,641,612	(0.68)
2015	3,602,946,462	(17.88)	817,259,532	(25.74)
2016	3,862,318,444	6.72	840,751,274	2.79
Average	3,171,844,025	5.30	873,734,228,5	1.19

Source, UN Comtrade (processed), 2017

The results of Novianti (2013) and Asikin (2016) studies show that infrastructure and institutional variables have positive effects on the Indonesia's export performance. However, based on reviews on the variables and scopes studied by previous researchers, the researchers considered that a further research is needed, both from the aspects of the variables and the scopes. This study tried to complement previous research by examining the flow of sub-sector exports, in this case, the export of Indonesia's fisheries sub-sector, and the export of Indonesia's main fisheries commodities, namely shrimp and tuna, mackerel tuna, as well as skipjack tuna.

Based on the previous description, the objectives of this study are: Analyzing the development of fisheries exports, shrimp and tuna, mackerel tuna, as well as skipjack tuna and the Indonesian trade facilitation; Analyzing the effect of trade facilitation on the export of Indonesia's fisheries sub-sector and the export of its main commodities, namely shrimp and tuna, mackerel tuna, as well as skipjack tuna.

## METHODS

This study used secondary data in the form of panel data with a time series of ten years, from 2007 to 2016 and the cross-section data of the ten main export destinations. Ten main export destinations for fisheries, shrimp, and tuna, can be seen in Table 2.

The fisheries subsector to be studied uses HS codes 0301, 0302, 0303, 0304, 0305, 0306, 0307, 1604, and 1605. The HS codes used for the export of shrimp are 030613, 030623, and 160520. The HS codes used for the export of tuna are the combination of 030231,

030232, 030233, 030239, 030342, 030349, and 160414 (Attachment 1). The types and sources of data used in the study can be seen in Table 3.

The first research objective i.e. the development of fisheries exports, shrimp and tuna, and the Indonesian trade facilitation was analyzed by descriptive statistics. The second research objective regarding the effect of trade facilitation on the Indonesian fisheries exports was analyzed by panel data regression with a gravity model that refers to the panel data model used in the research of Portugal-Perez and Wilson (2012) with some adjustments.

The model used to answer the second objective, both the influence of trade facilitation on Indonesian fisheries exports and the influence of trade facilitation on the export of the main fisheries commodities namely shrimp and tuna, is the same model as follows:

$$\ln EKS_{ij} = \beta_0 + \beta_1 \ln GDP_{cap_i} + \beta_2 \ln GDP_{cap_{ij}} + \beta_3 \ln DISTEK_{ij} + \beta_4 PORT_{ij} + \beta_5 ELPH_{ij} + \beta_6 ETCO_{ij} + \beta_7 TAB_{ij} + \beta_8 TRF_{ij} + \beta_9 NTRF_{ij} + \beta_{10} PRC_{ij} + e_{ij}$$

The expected parameter signs are  $\beta_2, \beta_4, \beta_5, \beta_6, \beta_7, \beta_{10} > 0$  and  $\beta_1, \beta_3, \beta_8, \beta_9 < 0$

Declining tariff barriers as a consequence of trade liberalization makes trade facilitation roles increasingly important. The WEF (2017) data show that the conditions and quality of Indonesian trade facilitation are still relatively left behind. The effect of trade facilitation on Indonesian fishery exports will be assessed by panel data regression estimation method with gravity model. The framework of research in Figure 1.

Table 2 The main destination countries for fisheries, shrimp and tuna exports

Destination Countries of Fisheries Export	Destination Countries of Shrimp Export	Destination Countries of Tuna Export
United State (USA)	United State (USA)	Japan (JPN)
Japan (JPN)	Japan (JPN)	United State (USA)
China (CHN)	Netherland (NLD)	Thailand (THA)
Thailand (THA)	China (CHN)	Saudi Arabia (SAU)
United Kingdom (GBR)	United Kingdom (GBR)	Italy (ITA)
Malaysia (MYS)	Germany (GER)	United Kingdom (GBR)
Netherland (NLD)	Canada (CAN)	Australia (AUS)
Singapore (SGP)	Hongkong (HKG)	Germany (GER)
Italy (ITA)	Taiwan (TWN)	Spain (ESP)
Hongkong (HKG)	Singapore (SGP)	Netherland (NLD)

## RESULTS

### Development of Fisheries Exports to Major Export Destination Countries and Trade Facilitation

The average value and growth of exports of fisheries, shrimp and tuna to the main destination countries are presented in Table 4. Indonesian fisheries, shrimp and tuna (tuna, mackerel tuna, as well as skipjack tuna) exports are dominant to the United States and Japan. However, the growth of fisheries exports to these two countries tends to slow down. Even the growth of tuna exports to these two countries shows a negative growth

due to the decline in Japanese fish consumption each year.

Indonesian fisheries exports to China show the highest growth, i.e. 40%. Taiwan is Indonesia's shrimp export destination country which shows the highest growth, and Spain is the export destination for tuna with the highest positive growth.

The Indonesian fisheries, shrimp, and tuna, exports to China show a high growth. This is due to the growth in consumption levels in China and the rapid growth of fisheries industrialization in China.

Table 3 Types and sources of research data

Variables	Unit	Data Sources
$EKS_{ij}$	US\$	UN Comtrade
$GDPcap_t$	US\$	WDI WB
$DISTEK_t$	Km	CEPII
$PORT_t$	Index 1 (worst) - 7 (best)	WEF
$ELPH_t$	Index 1 (unreliable) - 7 (extremely reliable)	WEF
$ETCO_t$	Index 1 (worst) - 7 (best)	WEF
$TAB_t$	Index 0 (worst) - 100 (best)	DB (WB)
$TRF_t$	%	WITS WB
$NTRF_t$	%	WTO
$PRC_t$	US\$/kg	UN Comtrade

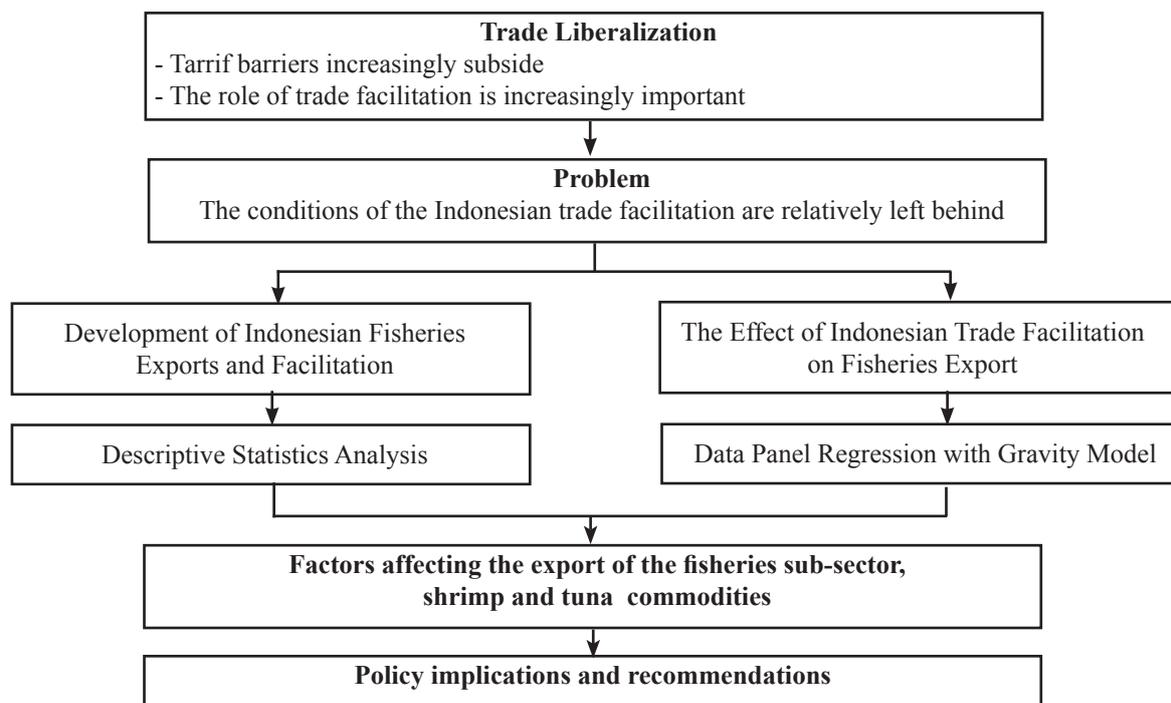


Figure 1. Research framework

The average index and growth of trade facilitation of Indonesia and partner countries can be seen in Table 5. The quality of Indonesia's port infrastructure and electricity supply are experiencing very good growth, but are still relatively lagging compared to those of partner countries. This indicates that the quality of Indonesia's ports and electricity supply have improved from year to year.

The index values of Indonesia's ethics and corruption are better than those of Italy and Thailand. This indicates that obedience to the rules and practices of corruption, collusion and nepotism are still a serious problem in Indonesia. The average growth of the ethics and corruption indexes is quite high, which shows that the Indonesian government continues to strive to create a clean government by reducing practices of corruption, collusion and nepotism.

Table 4. Average value of exports and export growth to partner countries

Countries	Fisheries Export Value (thousand \$)	Export Growth (%)	Countries	Shrimps Export Value (thousand \$)	Export Growth (%)	Countries	Tuna Export Value (thousand \$)	Export Growth (%)
USA	1,182,528	10.20	USA	714,716.11	15.01	JPN	133,477.88	-0.30
JPN	672,887	0.90	JPN	373,144.74	1.57	USA	70,152.30	-1.12
CHN	156,058	40.00	NLD	33,166.85	21.41	THA	52,871.77	31.52
THA	121,552	18.40	CHN	20,067.82	63.06	SAU	39,127.96	20.34
GBR	765,152	4.20	GBR	48,052.75	1.86	ITA	10,706.14	100.41
MYS	82,831	11.10	DEU	12,298.86	14.21	GBR	17,093.58	38.38
NLD	48,787	18.20	CAN	10,503.48	19.56	AUS	10,607.99	51.27
SGP	83,667	2.80	HKG	11,921.41	-5.57	DEU	18,345.29	-6.90
ITA	54,735	21.30	TWN	6.35	246.00	ESP	8,380.88	168.13
HKG	80,725	-0.40	SGP	8,446.82	14.41	NLD	4,393.29	39.17

Table 5 Average Index and growth of trade facilitation (2007–2016)

Countries	Port (PORT)		Electricity Supply (ELPH)		Ethics and Corruption (ETCO)		Cross-border Trading (TAB)	
	Index (1-7)	Growth (%)	Index (1-7)	Growth (%)	Index (1-7)	Growth (%)	Index (1-7)	Growth(%)
AUS	4.93	-0.30	6.11	-0.54	5.32	0.27	79.51	-1.27
CAN	5.60	-0.46	6.55	0.22	5.17	2.25	86.00	0.30
CHN	4.41	1.40	5.07	1.78	3.92	3.34	72.48	-0.08
DEU	6.01	-1.77	6.50	-0.94	5.12	0.19	88.78	0.32
HKG	6.56	-0.10	6.78	0.33	5.52	0.16	94.89	-0.17
IDN	3.59	4.28	4.00	1.24	3.41	2.82	75.37	0.51
ITA	3.96	3.85	5.68	1.00	2.90	1.19	84.05	2.47
JPN	5.29	-0.45	6.48	-0.08	4.85	2.72	87.10	-0.11
MYS	5.56	-0.60	5.80	0.05	4.50	-0.09	88.75	-0.80
NLD	6.71	0.19	6.73	0.07	5.76	0.37	89.22	1.60
SAU	4.90	0.48	6.08	1.24	5.14	2.55	73.19	-3.44
SGP	6.74	-0.17	6.72	0.35	6.39	0.09	95.95	-0.86
ESP	5.55	0.39	6.04	0.50	3.62	-1.32	85.92	2.09
TWN	5.39	-0.60	6.06	-0.09	4.40	2.85	83.43	0.00
THA	4.55	-0.74	5.37	-0.80	3.04	-0.23	79.60	4.57
GBR	5.52	0.16	6.59	0.20	5.11	1.52	87.50	1.12
USA	5.69	-0.03	6.28	-0.12	4.38	2.15	88.87	0.43

The value of Indonesia's cross-border trade index shows a better value, but its growth tends to slow down. Therefore, these aspects must still be considered in terms of improvement and quality improvement.

### The Effects of Trade Facilitation and Other Related Variables on the Indonesian Fisheries, Shrimp and Tuna Exports

The estimation method used is FEM because REM is invalid, and the Chow test results show that FEM is the best estimation method. The problem of heteroscedasticity between cross-section units and autocorrelation was corrected using Generalized Least Squares (GLS) FEM estimation method with cross-section weights and coefficient covariance white cross-section weights.

Overall estimation results show decent goodness of fit with P-value for F-stat less than 0.0001. The R-squared (R2) value of 98.86% in the fishery export model shows that 98.86% of the diversity of fisheries

export variables can be explained by the diversity of independent variables used, while the rest is explained by variables outside the model. Likewise, the shrimp and tuna export models show that 97.92% and 88.93% of the diversity of export variables in shrimp and tuna exports can be explained by the diversity of independent variables used, while the rest is explained by variables outside the model.

Durbin-Watson values in each model indicate a positive autocorrelation. According to Pyndick and Rubinfeld (1991), autocorrelation symptoms do not affect the validity of the model, only reducing the parameter estimation efficiency. Normality test (prob) shows a value greater than 0.1 in the three export models, which means the models have normal distributed error terms. Thus, the estimation results are quite representative in describing the influence of trade facilitation and other related variables on the performance of Indonesian fishery exports. The estimation results are summarized in Table 6.

Table 6. Estimation results on the influence of trade facilitation and other related variables on the export of Indonesian fishery

Variables	Fisheries Export	Shrimp Export	Tuna Export
C	6.7238	-2.0953	4.4393
LOG(GDPCAP_I)	-0.6608***	-0.9689**	-2.2774***
LOG(GDPCAP_J)	1.6909***	2.3270***	3.8808***
DISTEK	-0.0004***	-0.0004***	-0.0022***
PORT_I	0.1365***	0.0769 I	0.1863 I
ELPH_I	0.1826***	0.4426***	0.5560***
ETCO_I	0.0931***	0.5168*	0.1143 I
TAB_I	0.0060***	0.0036 I	0.0173***
LAGTRF	0.00171	0.0671 I	0.0924 I
NTRF	-0.0027*	0.0029 I	-0.0050 I
PRC	0.0914***	0.0192 I	0.1780*
R-squared	0.9886	0.9792	0.8893
Adj R-squared	0.9554	0.9742	0.8629
Prob(F-statistic)	0.0000	0.0000	0.0000
DW stat	1.1109	1.1916	0.7152
Sum squared resid			
- Weighted	4.3046	56.0953	50.9236
- Unweighted	5.3518	86.6412	64.8955
Normality Test (Prob)	0.6288	0.7236	0.6935

Note: \*\*\*(significant at 1%), \*\*(significant at 5%), \*(significant at 10%), I (Insignificant)

Estimation results indicate the direction (sign) that is in accordance with the economic theory, except the tariff variable on the three models and non-tariff variables in the shrimp export model but has an insignificant effect on the level of 10% so that it can be ignored. Port infrastructure has a positive effect on all three models and is significant at 1% real level in the fisheries export model. This means that an increase in the port infrastructure index will increase the value of fishery exports *ceteris paribus*. This is in line with the results of Novianti's (2013) research which states that the quality of port and airport infrastructure have a significantly positive effect on the flow of Indonesia's aggregate exports at real levels of 1% and 5%. Sepherd and Wilson (2008) also state that the quality of port infrastructure has a positive effect on fuel export flows at a significant level of 10%.

Improving the quality of port infrastructure will affect the efficiency of activities at the port. This condition allows the handling of trading volumes that are larger, more on time and at a lower cost so as to increase the export volume.

The quality of electricity supply has a positive and significant effect on the real level of one percent in all three export models. This means that an increase in the electricity supply index value by one point will increase 0.18% of the fishery export value, 0.44% of the shrimp export value, and 0.55% of the tuna export value, *ceteris paribus*. Apsari's (2011) study states that the establishment of adequate cold storage has a positive and significant effect on Indonesian tuna production for export. Considering that fishery products are perishable, the storage to avoid damages of the fishery products is highly needed and adequate electricity supply is required to support this.

Ethical and corruption indexes have a significant positive effect at the level of 1% in the fisheries model, and at the level of 10% in the shrimp export model. This means that an increase in the ethical and corruption indexes will increase the export value of fisheries by 0.09% and the export value of shrimp by 0.51%, *ceteris paribus*.

This is in line with the findings in Novianti's (2013) study that the more the absence of corruption as indicated by the corruption index, the greater the effect on bureaucratic costs. Smaller bureaucratic cost will

reduce the overall trading costs so that it can increase export volume.

The level of efficiency of cross-border trade in Indonesia has a positive effect on all three export models and is significant in the model of fisheries exports and tuna exports at the level of 1%. Increasing the cross-border trade efficiency index by one point will lead to an increase in the value of fishery exports by 0.006% and an increase in the export value of tuna by 0.017%, *ceteris paribus*. This means that a lower level of complexity can be seen from the length of export time (related to the time of loading and unloading and processing of export documents) and lower costs in the export process will increase exports. This is in line with the research results of Asikin (2016) and Iwanow and Kirkpatrick (2009).

Indonesia's GDP per capita has a significantly negative effect on all three export models. An increase of 1% of Indonesia's GDP per capita will reduce fisheries exports by 0.66%, shrimp exports by 0.96%, and tuna export by 2.27%, *ceteris paribus*. The results of this study are inversely proportional to the findings of Sihombing and Devina (2017) that states that the greater the GDP per capita of the exporting country, the greater the flow of its exports because GDP per capita describes the economic size of a country. For an exporting country, the economic size describes the country's production capacity to produce export commodities. However, the research results of Novianti (2013) and Asikin (2016) show that an increase in the value of GDP per capita in Indonesia will reduce the export flows. Oberman et al. (2012) revealed that Indonesia has a strong consumer class growth. The improvement of productivity and production capacity are needed, so that the increase in domestic demand as a result of an increase in GDP per capita that reflects an increase in purchasing power does not result in a reduction in Indonesia's export capacity.

GDP per capita of an export destination country has a significantly positive effect on all three export models. An increase of 1% in GDP per capita of an importing country will increase fisheries exports by 1.69%, shrimp exports by 2.32%, and tuna exports by 3.88%, *ceteris paribus*. This means that the higher the GDP per capita of an importing country, the higher the demand for imports of fisheries, shrimp and tuna products from Indonesia.

Economic distance has a significantly negative effect on the three export models at the level of 1%. An increase in economic distance of 100 km will reduce fishery exports by 0.04%, shrimp exports by 0.04% and tuna exports by 0.22%, *ceteris paribus*. This is in line with the research results by Zahidi (2012), Ayuwangi and Widyastutik (2013), Kristriana (2013), Ariyani (2016), Asikin (2016), and Sihombing and Devina (2017) that state that increasing economic distance will reduce export flows. Economic distance on export flows illustrates transportation costs.

In accordance with the expectation, the non-tariff variables show a significantly negative effect on the fisheries model. The increase in non-tariff rates of 1% will reduce 0.0027% of the value of Indonesian fisheries exports. The greater the non-tariff barriers, the lower the flow of fisheries exports. When compared with trade facilitation variables, the effect of non-tariff barriers on fisheries export flows is smaller. Even so, this non-tariff aspect needs to be considered by the government to improve the competitiveness of Indonesian fisheries.

### Managerial Implication

Based on the results of the research, to improve the Indonesian export performance of fisheries, shrimp, and tuna, it is necessary to improve and develop trade facilitation in terms of: 1) the construction of ports with good facilities and capacity, especially in areas outside Java and at the borders, 2) increase of the capacity and quality of electricity supply related to cold storage in order to improve the quality of fishery products, 3) eradication of corruption and illegal levies in Indonesian fisheries trade, and 4) acceleration of export time considering the perishable fishery products.

### CONCLUSIONS AND RECOMMENDATIONS

#### Conclusions

The volume and value of Indonesia's fisheries, shrimp and tuna, exports are experiencing growth. Similarly, the trade facilitation conditions covering the port quality, electricity supply, ethical and corruption indices, and the efficiency of cross-border trade are also improved. However, compared to those of the main export destination countries for fisheries, shrimp and tuna, Indonesia's facilitation conditions are still lagging behind.

The effect of trade facilitation and other related factors on export performance is different for each model, as follows: a) The variables that have a significantly positive effect on fisheries exports are the partner country's GDP per capita, port quality, electricity supply, ethics and corruption, efficiency of cross-border trade, and export prices; moreover, the variables that have a significantly negative effect are Indonesia's GDP per capita, economic distance, and non-tariff; b) The variables that have a significantly positive effect on shrimp exports are GDP per capita of a partner country, electricity supply, and ethical and corruption indices, while variables that have a significantly negative effect are Indonesia's GDP per capita and economic distance; c) The variables that have a significantly positive effect on tuna exports are partner country's GDP per capita, electricity supply, efficiency of cross-border trade, and export prices; furthermore, the variables that have a significantly negative effect are Indonesia's GDP per capita and economic distance.

### Recommendations

Research on other commodities, especially Indonesia's leading commodities using other trade facilitation variables can be the focus of further research. Research by distinguishing fresh, frozen, processed tuna, or fresh, frozen, and processed shrimp also needs to be done in further research. It is hoped that this research will enrich research on this theme.

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