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# Export Performance Analysis of Indonesian Processed Seaweed to The Seven Main Destination Countries from 2010 to 2019

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## Abstract

**Purpose:** The research aims to analyze the export performance of processed seaweed, its competitiveness, and determinants on seven main destination countries. **Research design, data and methodology:** The study uses data of seven main destination countries of Indonesian processed seaweed from 2010 to 2019. For competitiveness analysis, the study uses Revealed Comparative Advantage, Export Product Dynamics, and X-Model of Potential Export Product. **Results:** The study reveals that the export performance has decreased on all five countries except for Japan and USA. The X-Model analysis shows that the market classification has increased or been stable in every country except for Germany and France. GDP per capita of each destination country and competitiveness index have positive and significance effect while other factors have negative and significance effect. **Conclusions:** In 2019, Indonesia's processed seaweed market in Japan, United States, and France are on potential market, while Singapore and Italy are on optimistic market. In the future, Indonesia's processed seaweed export can be focused more on countries that have a good market potential. To improve the export volume, GDP per capita of destination country, and competitiveness index of Indonesian processed seaweed should be higher, while export price, economic distance, and real exchange rate should be lower.

**Keywords :** Indonesia Export Seaweed, RCA, EPD, X-Model, Panel Data Regression Analysis

**JEL Classification Code :** C23, F10, F40, Q22, P45

## 1. Introduction

International trade plays an important role in the economy of a country. According to Mankiw (2006), exports are sales and delivery activities of goods or services from within the country to other countries. According to the Indonesian Ministry of Trade (2014), the role of exports as one of the main sources of foreign exchange earnings are very important in supporting national economic

development. Indonesia's exports are dominated by non-oil and gas exports. Based on Statistics Indonesia data (2021), the role of non-oil and gas exports reaches the range of 79.62% to 94.91% during the period of 2010 to 2020. Seaweed export is one of the commodities with the most stable export performance and biggest contribution.

Table 1 explains that the volume and trade value of both export raw materials and processed products are experiencing an increasing trend. The export quantity in the

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form of raw materials is always higher than the processed product. In aggregate, during 2012-2019, Indonesia's seaweed exports dominated by exports in the raw materials form by 96.360% while exports in the form of processed products only reached 3.640% of Indonesia's total seaweed

exports. In 2019, the number of exported raw material seaweed increased by 35.129% from the previous year. This figure is much bigger than the exports growth of processed products in the same year which only increased by 2.986% from last year previously.

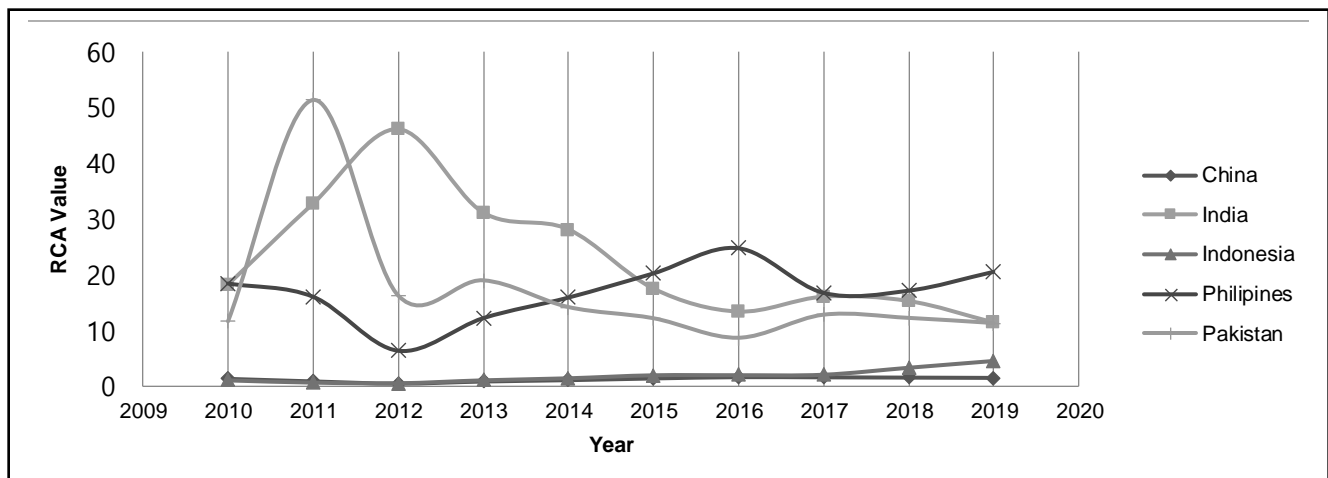
**Table 1:** Export Volume and Trade Value of Raw Materials and Processed Products of Indonesian Seaweed, Respectively, in Tons and Millions USD from 2012 to 2019

Year	Raw Material				Processed			
	Volume	Change	Value	Change	Volume	Change	Value	Change
2012	168.279,322		134,156		6.557,442		44,652	
2013	176.110,739	4,654%	162,456	21,095%	6.355,081	-3,086%	47,744	6,925%
2014	200.705,767	13,966%	226,229	39,256%	5.865,831	-7,699%	53,659	12,389%
2015	206.174,145	2,725%	160,264	-29,159%	5.939,364	1,254%	45,771	-14,700%
2016	182.371,133	-11,545%	124,008	-22,623%	6.448,800	8,577%	38,607	-15,652%
2017	184.592,540	1,218%	159,215	28,391%	8.254,339	27,998%	48,114	24,625%
2018	201.161,750	8,976%	209,142	31,358%	12.260,984	48,540%	85,367	77,427%
2019	271.828,640	35,129%	218,928	4,679%	12.627,151	2,986%	110,372	29,291%

Note: UN-Comtrade, processed.

Although the increase in the number of processed products exported is much less than in the form of raw materials, the trade value of processed products is experienced a higher increase. This is due to rising prices of processed seaweed in the world market. Indonesia which is part of "the coral triangle", the most potential area in the world for seaweed cultivation, should have a more competitive seaweed commodity in the world market. But if

you see in terms of competitiveness, Indonesian processed seaweed in international trade still less competitive than other exporting countries such as China, India, Philippines, and Pakistan as shown in Figure 1. India's Revealed Comparative Advantage (RCA) is the highest during the period 2010 to 2019 which reached 22,890 whereas the average RCA of Indonesia is only 1,838.



**Figure 1:** Comparison of Indonesian processed seaweed RCA and four other exporting countries from 2010 to 2019

Therefore, from the empirical facts above show that seaweed is one of most stable and potential export commodities of Indonesia, but still very underdeveloped. Moreover, based on a research did by Denantica (2019), the

trend of volume and export price of seaweed raw materials from Indonesia to China are expected to keep rising for five years ahead. China is a country who receive the biggest amount of seaweed raw materials export from Indonesia by

43,64% of the Indonesian total seaweed raw materials export in 2008. But the increase of the export price is expected to keep decreasing for five years ahead. Not only that, domestic problem also occurs due to the excess export of the raw material, that is the shortage of raw materials for domestic processing. This is also one of the reasons why the import of raw materials is increasing every year. This is an ironic, because Indonesia is a country with rich natural resource potential for seaweed. This lack of attention to the export of processed products makes Indonesian processed seaweed cannot compete with other countries. Indonesian processed seaweed is expected to have competitiveness in international trade so it can provide higher value in Indonesian seaweed export activities. Furthermore, to support the export of Indonesian processed seaweed, it is necessary to know what factors influence the export performance so that Indonesian processed seaweed can be developed more optimally in the future.

Therefore, this study aims to analyze the general description of the export performance, export competitiveness, and factors that affect the export performance of Indonesian processed seaweed in the seven main export destination countries. The seven main destination countries are the countries with biggest number of Indonesian processed seaweed export volume from Indonesia from 2010 to 2019. They are Germany, Japan, United States, France, Singapore, Malaysia, and Italy.

## 2. Literature Review

### 2.1. International Trade

International trade is a trade activity between countries which aims to make a profit. One of the international trading activities is export, which is the activity of selling and shipping a goods or services from within the country to other countries. According to Krugman and Obstfeld (1994) the export growth of a commodity is influenced by several factors: (1) the existence of competitiveness with other countries in the world, (2) the existence of price fixing domestic market and international market prices, (3) the existence of foreign demand, and (4) currency exchange rates.

### 2.2. Competitiveness

The competitiveness of a country will affect the success of trade in international market (Bustami & Hidayat, 2013). Approach that can be used to measure competitiveness can be seen from the level of comparative advantage and competitive advantage (Simanjuntak, 1992). Several methods that can be used to review the level of comparative

advantage of a commodity are: Revealed Comparative Advantage (RCA), Export Product Dynamics (EPD), and X-Model of Potential Export Product (X-Model).

### 2.3. GDP per Capita

The export performance of a country is influenced by the demand of the destination country where demand is influenced by GDP per capita as a reflection of the country's economy ability. Based on the definition of the Indonesia Statistics (2020), GDP per capita is the value of GDP divided by the total population in an area per certain period. In general, an increase in the importing country's GDP per capita increases consumption of the country so that the demand for imports also increases (Fitzsimons, Hogan, & Neary, 1999).

### 2.4. Export Price

Another factor that affects the demand of the destination country is the export price that offered. Price is the value that consumers give to get or use a product or service (Kotler & Armstrong, 2008). If the price of a good increases, producers will increase the quantity of the good produced (Rahardja & Manurung, 2010).

### 2.5. Economic Distance

In addition, according to Krugman (2009), the distance between countries is one of the important factors in international trade because it relates to transportation costs. The economic distance is used in the formulation of the model of trade between countries replacing the geographical distance variable because it considers the share of GDP between different countries that shows the country's economic growth (Li & Zhou, 2008). According to Wahyudi and Anggita (2015), economic distance has a negative effect on export volume because the farther the distance traveled, the more expensive the cost transportation and logistics required. The greater economic distance shows that the greater geographical distance and the greater economic differences between countries will increase barriers in terms of transportation costs and economic conditions which cause a decrease in the volume of exports between these countries.

### 2.6. Real Exchange Rate

Another factor that affects a country's export performance is the currency exchange rate. Mankiw (2006) states that exchange rate show the relative price of goods of the two countries. If the exporting country's exchange rate against the importing country weakens, then the incentive to export will decrease because sellers will prefer to sell their

products domestically because it is more profitable. On the other hand, when the exchange rate of the exporting country against the importing country strengthens, the volume of exports from exporting countries to importing countries will increase.

### 3. Research Methods and Materials

The study uses secondary data from seven main export destination countries for processed seaweed from Indonesia. The seven main destination countries are Germany, Japan, United States, France, Singapore, Malaysia, and Italy in the 2010 to 2019. This research excludes 2020's data because in that year there was Covid-19 pandemic which made an extreme change of data that can affect the analysis result. These seven countries are the main export destination countries for processed seaweed from Indonesia which have always been the largest. Source of data obtained from UN-Comtrade.

#### 3.1. Competitiveness Analysis

##### 3.1.1. Revealed Comparative Advantage

Competitiveness analysis using the X-Model method to analyze the export competitiveness of Indonesian processed seaweed in seven main destination countries. X-Model competitiveness analysis is a combination of the results of the RCA and EPD analysis. The RCA analysis produce an index that will measure between the share of commodity exports or a group of commodities in a country to the share of overall exports in world of trade. The formula for calculating the RCA index is as follows (Kanaka and Chinadurai, 2012):

$$RCA_{PS,i} = \frac{X_{PS,i}/X_{TE,i}}{W_{PS,i}/W_{TE,i}} \tag{1}$$

where  $X_{PS,i}$  is the export value of Indonesian processed seaweed in country i,  $X_{TE,i}$  is the total value of Indonesia's exports in country i,  $W_{PS,i}$  is the export value of Indonesian processed seaweed in country i, and  $W_{TE,i}$  is the total value of world exports in country i.

##### 3.1.2. Export Product Dynamics

EPD analysis is used to measure the market position of a country's products for specific market which able to compare export performance between countries around the world. The EPD matrix consists of market attractiveness and strength information business. Market attractiveness is calculated

based on the growth of the product demand for specific market purposes, where business strength information is measured on the basis of growth of a country's market share in a particular market target. Combination of market attractiveness and business strength result in the positioning character of the analyzed product into four categories. The four categories are "Rising Star", "Falling Star", "Lost Opportunity" and "Retreat". The formula for calculating EPD is as follows (Hasibuan, Nurmalina, & Wahyudi, 2012):

$$X \text{ axis} = \left( \frac{X_{TE,i}}{W_{TE,i}} \right)_t \times 100\% - \left( \frac{X_{TE,i}}{W_{TE,i}} \right)_{t-1} \times 100\% \tag{1}$$

$$Y \text{ axis} = \left( \frac{X_{PS,i}}{W_{PS,i}} \right)_t \times 100\% - \left( \frac{X_{PS,i}}{W_{PS,i}} \right)_{t-1} \times 100\% \tag{2}$$

Where X axis is export market share growth, Y axis is product market share growth,  $X_{TE,i}$  is the total value of Indonesia's exports in country i,  $W_{TE,i}$  is the total value of world exports in country i,  $X_{PS,i}$  is the value of Indonesian processed seaweed in country i,  $W_{PS,i}$  is the export value of processed seaweed in the world in country i, t is the t-th year, and i is the export destination country (Germany, Japan, United States, France, Singapore, Malaysia and Italy). Figure 2 shows how to determine the categorization of commodity market positions in EPD analysis.

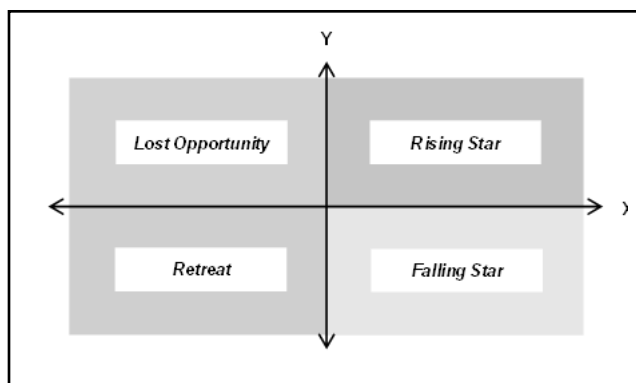


Figure 2: Categorization of commodity market positions in EPD analysis

##### 3.1.3. X-Model of Potential Export Product

The X-Model of Potential Export Product method or X-Model is a method that analyzes the combination of the RCA and EPD analysis results. Table 2 shows the clustering of the results of the X-Model analysis.

**Table 2:** Clustering analysis of X-Model

RCA	EPD	X-Model
>1	Rising Star	Optimistic Market
	Lost opportunity	Potential Market
	Falling Star	Potential Market
	Retreat	Less Potential
<1	Rising Star	Potential Market
	Lost opportunity	Less Potential
	Falling Star	Less Potential
	Retreat	No Potential

Note: Indonesian Trade Ministry, 2017

### 3.2. Panel Data Regression Analysis

Inferential analysis with panel data regression to analyze the determinants of the export volume of Indonesian processed seaweed to seven main destination countries. The model formed in this study is as follows:

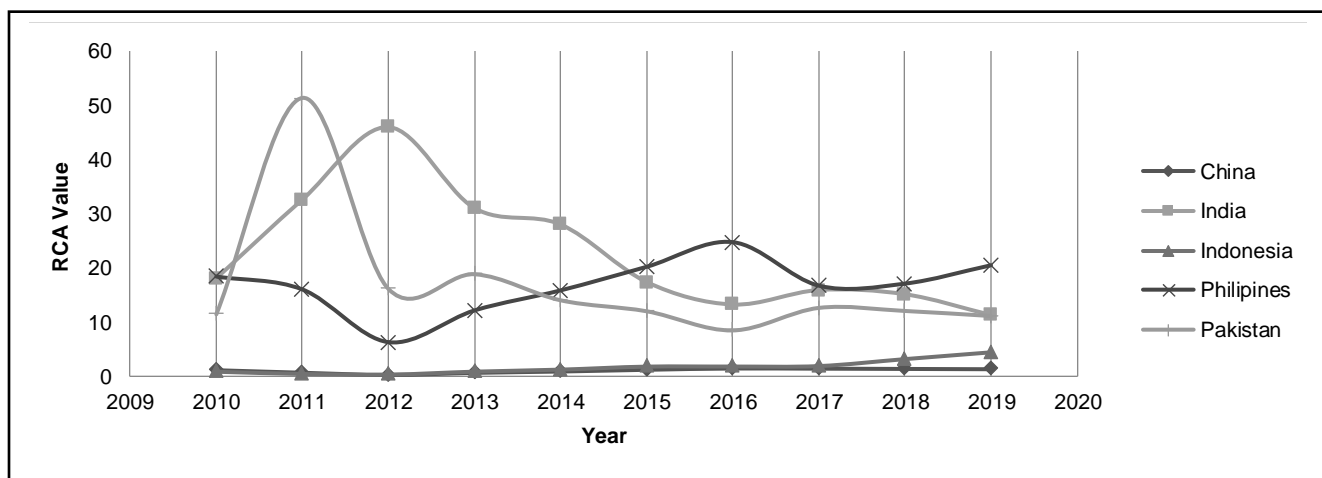
$$LnVEI_{it} = \alpha_i + \beta_1 LnGDPC_{it} + \beta_2 LnHE_{it} + \beta_3 LnJE_{it} + \beta_4 LnRER_{it} + \beta_5 RCA_{it} + v_{it} \quad (3)$$

Where  $\alpha_i = \alpha + \mu_i$ , with  $\alpha_i$  is the intercept of country  $i$ ,  $\mu_i$  is the individual specific effect of country  $i$ ,  $v_{it}$  is the combined error component of country  $i$  and period  $t$ . Then  $VEI_{it}$  is the export volume of Indonesian processed seaweed to country  $i$  in year  $t$ ,  $GDPC_{it}$  is the GDP per capita of country  $i$  in year  $t$ ,  $HE_{it}$  is the export price of Indonesian processed seaweed products to country  $i$  in year  $t$ ,  $JE_{it}$  is the

economic distance between Indonesia and country  $i$  in year  $t$ ,  $RER_{it}$  is the real exchange rate rupiah against the currency of country  $i$  in year  $t$ , and  $RCA_{it}$  is the index of competitiveness Indonesian processed seaweed products in country  $i$  in year  $t$ , where  $i$  is Germany, Japan, United States, France, Singapore, Malaysia, and Italy, and  $t$  is year 2010 to 2019.

### 4. Results and Discussion

The general description analysis of the export performance of Indonesian processed seaweed is starting from the analysis of net exports, export value and import value of processed seaweed during 2010 to 2019 as can be seen in Figure 3. During period 2010-2019, net exports of processed seaweed from Indonesia to the world tended to be continued to increase. The highest export value ever achieved was 110.372 million US\$ in 2019 and the lowest was US\$ 19,680 million in 2010. It shows that the exports in processed form promise large state revenues. According to Abdul Basith, the Indonesian Seaweed Commission's Leader (2018), the high increase in the value of exports occurred in 2018 in addition to being caused by an increase in export volume as a from the United States government's policy of maintaining Indonesian processed seaweed on the country's list of organic products. The high increase in the exports value is also due to China's increasing demand for Indonesian processed seaweed and the rising world price of processed seaweed itself.



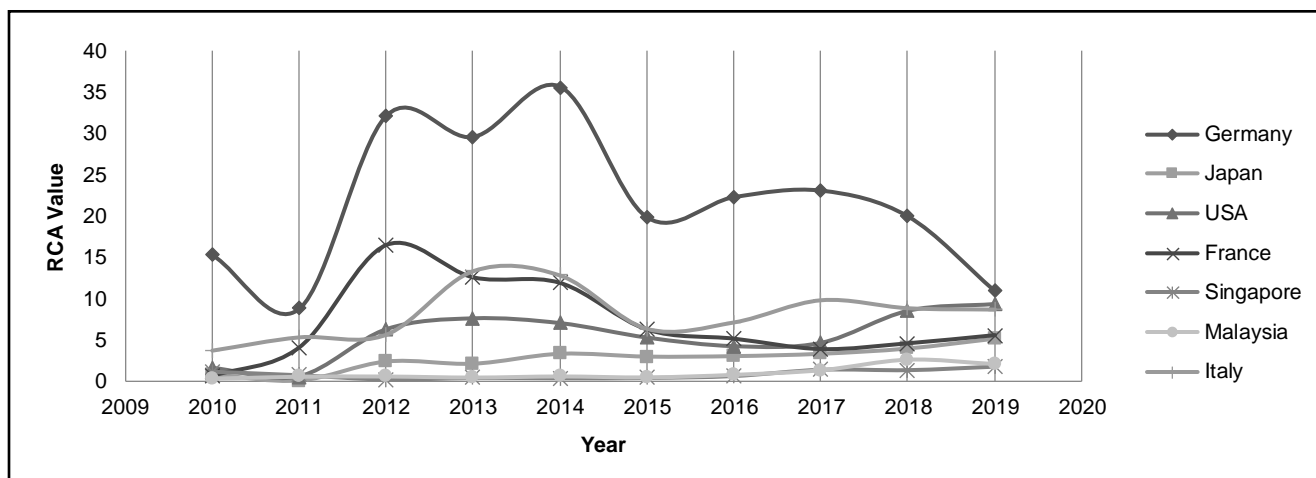
**Figure 3:** Development of net exports, trade value of exports and imports total of Indonesian processed seaweed in million US\$ from 2010 to 2019

### 4.1. Competitiveness Analysis

#### 4.1.1. Revealed Comparative Advantage

The result of the RCA analysis is shown in Figure 4 which is a graph of the competitiveness index performance of Indonesian processed seaweed for the period 2010 to 2019 in seven main destination countries. Based on the results of the RCA analysis, among the seven main countries, the highest average RCA value for Indonesian processed seaweed products was obtained by Germany with 21.7609. This shows

that on average at period 2010 to 2019, Indonesian processed seaweed in Germany have a high competitiveness, even the highest among other major destination countries. Whereas the lowest average RCA value was obtained by Singapore with a value of 0.863. This value indicates that on average, Indonesian processed seaweed in Singapore are not competitive. The RCA values of Germany and Italy are always on top, meaning that Indonesian processed seaweed products in the two countries is always competitive.



**Figure 4:** Development of RCA value of Indonesian processed seaweed products in the main destination countries export from 2010 to 2019

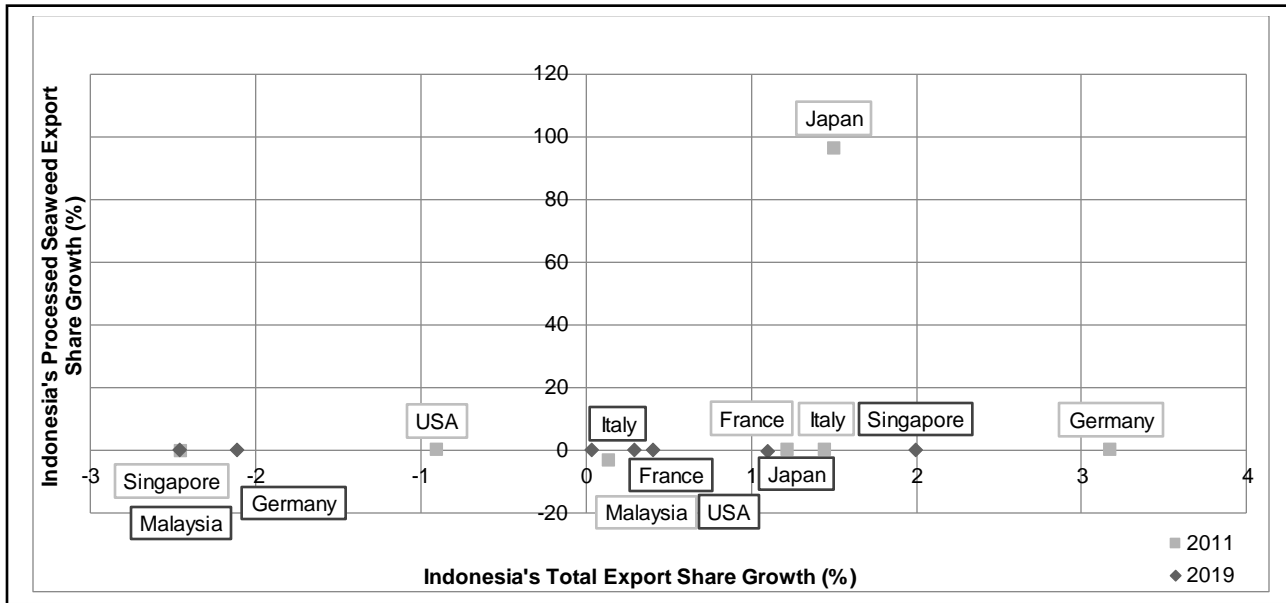
RCA value of Indonesian processed seaweed in Japan and the United States although not large but shows an increase from year to year. Whereas in Malaysia and Singapore, the development of the RCA value of Indonesian processed seaweed tend to stagnate. Then in Italy, although fluctuating, the RCA value of Indonesian processed seaweed is always high and even reaches ranked 2nd or 3rd among six other countries during the 2010-2019.

#### 4.1.2. Export Product Dynamics

Figure 5 shows the results of the EPD analysis of Indonesian processed seaweed in the seven main export destination countries at the beginning and ending of research

period. The results of the calculation of the competitiveness of Indonesian processed seaweed products with EPD method shows that at the beginning of the period, Japan, France, Italy and Germany were in the “rising star” position, meanwhile Singapore and the United States were in the “retreat” position, and Malaysia was in the “falling star” position. The “rising star” position shows the most ideal market position, while “retreat” and “falling star” are less ideal market positions. At the end of the study period, Japan, United States, and France were in the “falling star” position, Italy and Singapore were in the “rising star” position, and Malaysia and Germany were in the position of “retreat”.





**Figure 5:** EPD categorization of Indonesian processed seaweed in seven main export destination countries from 2010 to 2019

Based on national seaweed production data from the Indonesian Ministry of Marine Affairs and Fisheries (2020), there has been a decline in seaweed production from 2015 to 2019 by 63.8% which resulted in a decrease in the export volume of processed seaweed Indonesia in general so that the value of its exports also decreases.

**4.1.3. X-Model of Potential Export Product**

Table 3 shows the competitive performance of Indonesian processed seaweed from 2010 to 2019 in the seven main destination countries from the results of the X-Model clusterization.

**Table 3:** X-Model clusterization of Indonesian processed seaweed products in seven main export destination countries

Year	RCA		Market Position (EPD)		Clusterization (X-Model)	
	2011	2019	2011	2019	2011	2019
Germany	8,829	10,954	Rising Star	Retreat	Optimistic Market	Less Potential
Japan	0,048	5,212	Rising Star	Falling Star	Potential Market	Potential Market
USA	0,572	9,397	Retreat	Falling Star	No Potential	Potential Market
France	4,072	5,561	Rising Star	Falling Star	Optimistic Market	Potential Market
Singapore	0,751	1,788	Retreat	Rising Star	No Potential	Optimistic Market
Malaysia	0,596	2,115	Falling Star	Retreat	Less Potential	Less Potential
Italy	5,353	8,731	Rising Star	Rising Star	Optimistic Market	Optimistic Market

The results of the clustering show that at the beginning of the period, three of the seven countries were in the optimistic market category; they were Germany, France, and Italy. In addition, Japan was in the potential market category and Malaysia was in the less potential market category. Meanwhile, Singapore and the United States were in the no potential market category. At the end of the period, Japan, the United States, and France were in the potential market category countries. Meanwhile, Malaysia and Germany are

in the category of less potential market. Singapore and Italy are in the best market category, the optimistic market.

**4.2. Panel Data Regression Analysis**

In panel data regression, to get the best model it is necessary to do several tests as shown in Table 4. Chow test was carried out to determine the best model between Common Effect Model and Fixed Effect Model, and the decision was the Fixed Effect Model was better. To

determine which one is the best between the Fixed Effect Model and the Random Effect Model, the Hausman test was carried out, and the decision was that the Fixed Effect Model was better than Random Effect Model. Thus, the best model for this study is Fixed Effect Models. After conducting a series of tests from selecting the best model, the homoscedasticity, and Cross-sectional Correlation test, the best model decided to use in this study is the Fixed Effect Model with Seemingly Unrelated Regression (SUR).

**Table 4:** Summary results of selecting the best model

Test	Result	Conclusion
Chow	Prob. 0,000	FEM is better than CEM
Hausman	Prob. 0,000	FEM is better than REM
Glejser	There is prob. < 0,05	Heteroscedastic
Cross-sectional Correlation	Prob. 0,000	There is cross-sectional correlation
Normality	Prob. 0,603	Normal
Multicollinearity	VIF < 10	There is no multicollinearity

The Summary of Fixed Effect Model with Seemingly Unrelated Regression (SUR) estimation results is shown in Table 5.

**Table 5:** Summary of Fixed Effect Model (FEM) estimation results with Seemingly Unrelated Regression (SUR)

Variable	Coefficient	t-Stats	t-Table
C*	-63,092	-5,409	-1,671
LnGDPC*	12,303	6,680	1,671
LnHE*	-0,679	-23,311	-1,671
LnJE*	-8,033	-6,187	-1,671
LnRER*	-0,271	-1,720	-1,671
RCA*	0,103	17,128	1,671
Summary of Statistics			
Coefficient of Determination (R-squared)	0,973	F-statistics	195,386
Adjusted R-squared	0,968	Prob. (F-statistics)	0,000

Based on the estimation results in Table 5, the following equation is obtained:

$$Ln\widehat{VEI}_{it} = (-63,092 + \hat{\mu}_i) + 12,303 LnGDPC_{it}^* - 0,679 LnHE_{it}^* - 8,033 LnJE_{it}^* - 0,271 LnRER_{it}^* + 0,103 RCA_{it}^* \tag{5}$$

Where  $\hat{\mu}_i$  is the specific effects of individual country i.

In the former model, the resulting R-squared value is 0.973 and adjusted R-squared is 0.968. This figure shows that the variables independent in the model can explain the diversity of export volumes of Indonesian processed seaweed to the seven main destination countries by 96.8 percent, while the rest is explained by other variables not included in the model. With the resulting F test statistic value of 195.387 and a probability of 0.000, it can be concluded that at a significance level of 0.05 all independent variables simultaneously affect the diversity of the export volume of Indonesian processed seaweed to the seven main destination countries. Based on the results of the partial test, the value of t-statistics on the LnGDPC variable, and RCA is greater than the value of  $t_{(0.05;58)}$  which is equal to 1.671. Meanwhile the t-statistics on the LnHE, LnJE, LnRER variables are smaller than the value of  $-t_{(0.05;58)}$  which is equal to -1.671, which indicates that at a significance level of 0.05 LnGDPC, LnHE, LnJE, LnRER, and RCA variables have a significant effect to the export volume of Indonesian processed seaweed to the main destination countries.

Panel data regression analysis with Fixed Effect Model will produce different error for each individual as shown in Table 6. Individual specific effects are used to differentiate the export volume of Indonesian processed seaweed between destination countries when all independent variables are considered constant. Countries that have the biggest individual specific effect values is Italy. It can be interpreted that when all independent variables values in each country are the same, then Italy has the biggest volume of Indonesian processed seaweed or bigger than other countries. Meanwhile, Singapore has the lowest individual specific effect value. It means, when the value of the independent variable is the same in each country, then Singapore will have the smallest export volume of Indonesian processed seaweed.

**Table 6:** Individual effects of panel data regression analysis result

Country	Effect
Germany	2.520763
Japan	-0.945082
USA	5.787936
France	4.162088
Singapore	-20.20978
Malaysia	2.672416
Italy	6.011662

The GDP per capita of the destination country has a significant effect on export volume of Indonesian processed seaweed with a significance level of 0.05. The slope of the LnGDPC variable is 12,303. This means that if there is a one



percent increase in the GDP per capita of the destination country it will increase the export volume of Indonesian processed seaweed products by 12,303 percent. This result is in accordance with the economic theory which states that the amount of GDP per capita of a country shows the magnitude of the country's opportunity to trade with other countries (Mankiw, 2006).

The export price variable to the destination country has a significant effect on export volume of Indonesian processed seaweed products with a significance level of 0.05. The slope value of the LnHE variable is -0.679. This means that if there is a one percent increase in the export price in the destination country, it will reduce the export volume of Indonesian processed seaweed products by 0.679 percent. This result is in accordance with the economic theory which states that the demand for an item is influenced by the price level (Mankiw, 2006). The lower export price of Indonesian processed seaweed products in the destination country, the demand will increase. The increase in the export price of Indonesian processed seaweed can causes the importing country to turn to another supplying country which have a lower price or the same price but with higher quality.

The economic distance between Indonesia and the destination country variable has a negative and significant effect on the export volume of Indonesian processed seaweed with a significance level of 0.05. The slope value of the LnJE variable is -8.033. This means that if there is a one percent increase in the economic distance between Indonesia and the destination country, it will reduce the export volume of Indonesian processed seaweed to the country by 8.033 percent. This result is also in accordance with the economics theory which states that the farther the distance between countries, the higher the transportation and logistics cost will be so that trade performance will decline, in this case the volume of exports will decrease (Wahyudi & Anggita, 2015). The farther the economic distance between Indonesia and the destination country, exports will be smaller because producers are trying to reduce transportation and logistics costs so that it is not too expensive. On the other hand, the closer the economic distance between Indonesia and the destination country, the number of exports will be even greater because it is easier and more affordable on transportation or logistics.

The variable of the real exchange rate of the rupiah against the currency of the destination country has a significant effect to the export volume of Indonesian processed seaweed with a significance level of 0.05. The slope value of the LnRER variable is -0.271. This means that if there is a one percent increase in the real exchange rate of rupiah against the currency of the destination country, it will reduce the volume of Indonesian processed seaweed exports by 0.271 percent. This is in line with the theory of Mankiw (2006) which states that when the real exchange rate

increases, foreign goods become cheaper and domestic prices become more expensive. So that exporters tend to sell their products domestically because it is more profitable than selling abroad.

The competitiveness index variable in the destination country has a significant effect to the export volume of Indonesian processed seaweed with a significance level of 0.05. The slope value of the RCA variable is 0.103. This means that if there is an increase of one unit of competitiveness index in the destination country, it will increase the export volume of Indonesian processed seaweed products by 10.3 percent. This result is also in accordance with the economic theory which states that the high and low competitiveness of a country will affect success trade in the international market which in this case is reflected in the volume of exports. If the competitiveness index in the destination country increases, then the export volume of Indonesian processed seaweed will also increase. This result is also relevant to the research conducted by Viola Rachma and Fitri Kartiasih (2019), that the competitiveness index has a positive and significant effect in increasing pineapple export volume to main destination countries export.

## 5. Conclusions

Based on the results of the previous discussion, it can be concluded that: (1) The export performance of Indonesian processed seaweed during the period 2010 to 2019 tends to decline, except in Japan and the United States; (2) Based on the results of the RCA analysis, it can be concluded that on average from 2010 to 2019, Indonesian processed seaweed has competitiveness in Germany, Japan, United States, France, Malaysia and Italy. Meanwhile in Singapore, Indonesian processed seaweed is not competitive. Based on the results of the EPD analysis from 2011 to 2019, the market positions of Indonesian processed seaweed in all seven main destination countries decreased, except for the United States, Singapore and Italy. Lastly, based on the results of the X-Model analysis, Indonesian processed seaweed in Germany and France experienced a decline in market categories. Meanwhile in the United States and Singapore, Indonesian processed seaweed experienced an increasing in market category. Meanwhile, the market category of Indonesian processed seaweed in Japan, Malaysia and Italy did not change; (3) GDP per capita of destination country and the competitiveness index have a positive and significant effect to volume export of Indonesian processed seaweed. On the other hand, the export price in destination country, economic distance, and the real exchange rate has a negative and significant effect to the export volume of Indonesian processed seaweed. For

further research, it is recommended to use a dummy variable to distinguish whether there is competitiveness from the results of the RCA, EPD, and X-Model analysis before proceeding to the panel analysis.

However, this research only analyzes export performance based on quantitative data without including the possibility of a behavioral tendency of investors who intentionally send seaweed in the form of raw materials to their country to be processed there. This might be one of the factors why the volume of exports in the form of raw materials is always higher.

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