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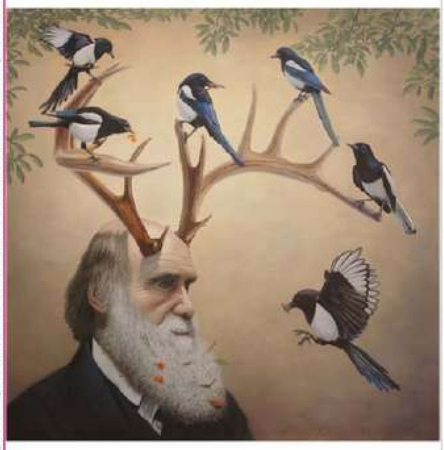

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Competitiveness Analysis and Factors That Influence the Export of Indonesian Shrimp Commodities

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Abstract

The purpose of this study was to analyse the level of the country's competitiveness in the shrimp market and the factors affecting the shrimp exports in major importing countries. The analysis was conducted through the application of Revealed Comparative Advantage (RCA) and Panel Gravity Model. The findings showed that the country's GDP per capita and distance variables have a negative relationship with shrimp commodity exports while the GDP per capita for the importing countries, export prices, and population have a positive relationship. In conclusion, the Indonesian GDP and GDP in the destination country have a positive effect on the exports.

Keywords: Export, Shrimp, Competitiveness, RCA, Gravity.

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Análisis de competitividad y factores que influyen en la exportación de productos de camarón indonesios

Resumen

El propósito de este estudio fue analizar el nivel de competitividad del país en el mercado del camarón y los factores que afectan las exportaciones de camarón en los principales países importadores. El análisis se realizó a través de la aplicación de la Ventaja Comparativa Revelada (RCA) y el Modelo de Gravedad del Panel. Los resultados mostraron que el PIB per cápita y las variables de distancia del país tienen una relación negativa con las exportaciones de productos básicos de camarón, mientras que el PIB per cápita para los países importadores, los precios de exportación y la población tienen una relación positiva. En conclusión, el PIB de Indonesia y el PIB en el país de destino tienen un efecto positivo en las exportaciones.

Palabras clave: Exportación, Camarón, Competitividad, RCA, Gravedad.

1. INTRODUCTION

The fisheries sector has a strong role in the Indonesian economy. The country has around 2/3 of its total area (approximately 5.8 million km2,) covered with water and this makes it has the potential for abundant fisheries and aquaculture. The fisheries sector has a significant contribution to Indonesia's GDP (Gross Domestic Product) and provides jobs to the large size of the population. Shrimp

is one of the primary export commodities because of its high economic value. Indonesia is one of the largest producer and also one of the largest exporters in ASEAN, even is one of the largest in the world. In 2014, the volume of shrimp export is almost 11 percent of Indonesian fishery export. In addition to its usefulness as a major contributor to foreign exchange and a source of income for coastal communities, Indonesia is also the largest shrimp's producer country in ASEAN in 2014 with 592 thousand tons. It was stated that 70.6 percent of this is in the frozen form with the export value of US$1.7 billion, processed ones constituted only 27.9 percent, while the remaining 1.5 percent is in fresh form.

The change in the diet of the world community from red to white meat makes consumers be more familiar with shrimps in developed countries. Furthermore, trade liberalization has increased the competition in the export of this product in the international market. As a result of this, Indonesian exporters have engaged in different strategies in order to make sure that they compete in the international market. This is necessary because according to Porter (1990), competitiveness is one of the criteria that determine the success of a country's trade and a necessary condition that must be possessed for a commodity to survive in the international market. According to Porter (1990), there is competitiveness in the productivity from each input unit used. Increase in productivity can be observed from an increase in the number of physical inputs (capital and labour), the quality of inputs used, and technology (total factor

productivity). Productivity can be affected by comparative advantage based on the fact that it is a major determinant in international trade.

Based on this background, the objectives of this study were to:

1. Analyse the competitiveness of Indonesian shrimp commodities based on comparative advantage in their main importing countries (United States, Japan, China, England, and France).
2. Analyse the effect of GDP per capita, the value of export, population size and proximity of Indonesia to main importing countries (USA, Japan, China, Britain, and France).

Comparative advantage is a general concept used in explaining the pattern of trade and the ability of a country to produce goods and services at a lower cost than others. A theory formulated by David Ricardo in 1817 Salvatore (2014) states that trade can still occur between states even if a country has an absolute loss to other countries in producing a commodity. On the other hand, Heckscher-Ohlin stressed that the difference in opportunity cost is a factor causing international trade and that this happens because of variations in production factors (endowment factors) and their intensive use in the production of exported goods. Therefore, a state will specialize and export goods that have relatively large and cheap production factors in the production process and vice versa.

In addition to comparative advantage, a country needs a competitive advantage to compete in the international market. This can be obtained from the ability of companies located within such a country to compete in producing products that can survive in the

global market (Porter, 1990). Competitive advantage measures profits in trade based on market prices that can be changed by policy and other causes while the comparative advantage is measured based on shadow prices or economic analysis. The comparative advantage is needed so that commodities with economic efficiency would have the upper hand in the production process. It also has the ability to measure the competitiveness that will be achieved by a country if there is no change in the economy.

The competitiveness can be measured using the RCA (Revealed Comparative Advantage) which was introduced by (Balassa, 1965). The RCA method can be used to measure the performance of certain commodities exported, by calculating country market share against total exports compared to the share of the world trade commodities. If the RCA value is greater than one, the country has a comparative advantage in the international market, hence, the commodity has strong competitiveness. Conversely, if the value is less than one, then the country does not have a comparative advantage in the international market; hence, the commodity is weak competitively. One of the benefits of RCA is that it provides a systematic framework for comparing various structural differences between countries which has the ability to provide useful information for the policy-making process. Another benefit is that data can be easily obtained for its analysis. On the downside, high specialization is not purely a reflection of the comparative advantage of a country using this method, but it is based on the results of policy intervention or other distortions.

RCA is widely used for analysing the competitiveness of shrimp export in Asia. Wati et al. (2010) compared the competitiveness of Indonesian and Thailand's shrimp export, while Ramasoot and Krajangwong (2016) pay more attention to the comparative advantage of Thailand's shrimp export. Geethalakshmi et al. (2010) analysed the price and competitiveness of Indian shrimp export to international markets. Kiet and Sumalde (2008) analysed the comparative and competitive advantage of Vietnamese shrimp export, especially from Mekong river delta.

In addition to the RCA, Gravity Model, with a variable distance incorporated into it, can be used to analyse factors that influence trade between two countries (Indonesia and the export destination countries). The gravity model is founded on Newton 's law of gravity which states that "The interaction between two objects is proportional to their mass and inversely proportional to the distance of each". Therefore, the model states that trade between the two countries is directly related to the income of each country and is inversely related to trade barriers, namely the distance between the two countries. The model, which was first developed by Tinbergen, can be used to analyse economic and non-economic factors that can affect trade flows between two countries. It was later redeveloped by Bergstrand so that it will not be limited to the analysis of trade in aggregate, but also the flow of trade for a particular commodity. In subsequent developments, other variables added include per capita income, national boundaries, language and cultural equality, and colonialism history and tariffs.

The use of the gravity model to identify the determinant of shrimp export is limited. However, the example of the use of the gravity model to identify the factor affecting export can be taken from other products. In the Indonesian context, Pradipta (2014) conducted a study on the Competitiveness and Factors Affecting Indonesian Fruit Exports using the Revealed Comparative Advantage (RCA), Export Product Dynamic (EPD) and Gravity Model. The results showed that the observable factors influencing the export flow of Indonesian fruit to destination countries include export prices, population, economic distance, real and per capita GDP, real exchange rates, Indonesian consumer price index, and dummy variables in Europe (Krugman & Obstfeld, 2009).

2. DATA AND METHODS

This research uses secondary data from UN Comtrade, World Bank, Ministry of Maritime Affairs and Fisheries, and Geo Data Source. Panel data analysis of the five importing countries: United States, Japan, China, Britain, and France was applied for the period of 2007-2014. Revealed Comparative Advantage (RCA) and Gravity Model panel data regression analysis were used to serve analytical purposes. Revealed Comparative Advantage (RCA) was used to measure the comparative advantage of certain commodities in the country by evaluating the role of their exports in the country's total

exports compared to their market share in international trade. Mathematically, the RCA formula is as follows:

RCA Model Variables:

Xi j = Indonesian commodity export value to the main importing country

Xt = Indonesia's total export value to the main importing country

Wi j = World export value for commodities to the main importing country

Wt = The total value of world export to the main importing country

Gravity Model panel data regression was also employed in this research. Model estimation is transformed into ln (natural logarithm) form in order to deal with normality issues. The transformed econometric model is as follows:

$$\ln(Expijt) = ß0 + ß1\ln(GDPiit) + ß2\ln(GDPjjt) + ß3\ln(Priceijt) + ß4\ln(Popjt) + ß5\ln(Distij) + \varepsilon ijt$$

Where:

ExpIJT = Export value of shrimp commodity (i) Indonesia to country j in year t

GDPiit = GDP per capita of real country (i) Indonesia in year t

GDP jt = Real GDP per capita of country j in year t

Price ijt = Price of shrimp commodity exports (i) Indonesia to country j in year t

Pop jt = Population om country j in year t

Distij = Distance between country (i) Indonesia and country j

ε ijt = Error term

ß0 = Constant

ß = Estimated parameters (n = 1, 2, ..., 5)

ln = Natural logarithm

The gravity model was estimated using pooled least square (PLS), fixed effect models (FEM), and random effect models (REM). Chow test and the Hausman test was applied to select the estimation model. Chow test compared pooled least square and fixed-effect model and inform whether panel data analysis would be more robust compared to the pooled cross-section, as the result fixed effect is preferred. Hausman test compares the fixed-effect model and random effect model, as a result, the random effect is preferred. Further tests inform that there is no multicollinearity and autocorrelation in the model.

3. RESULT

Windu Shrimp and Vannamei shrimp are two dominant shrimp products in Indonesia. However, the data from Marine and Fisheries ministry (Table 1 below) shows that Indonesian shrimp production and export volume do not consistently increase. The peak of production and export happen in 2013, then declining in 2014.

Table 1: Indonesian Shrimp Production and Export

Commodity	Year				
	2010	2011	2012	2013	2014
Production Volume (ton)	380.972	401.154	415.703	638.955	592.219
Windu Shrimp	125.519	126.157	117.888	171.583	126.595
Vannamei shrimp	206.578	246.420	251.763	390.278	411.729
Shrimp (Other)	48.875	28.577	46.052	77.094	53.895
Export Volume (ton)					
Shrimp (Total)	145.092	158.062	162.068	162.410	141.042

Analysis of the level of competitiveness based on comparative advantage was carried out through the application of Revealed Comparative Advantage (RCA) method. As stated earlier, RCA values greater than one (RCA> 1) indicate that the commodities analysed have comparative advantages or strong competitiveness, so they can focus on export orientation while values less than one (RCA <1) indicate that the commodity does not have comparative advantage or weak competitiveness, so it will be better not to be export-oriented.

Table 2: Estimated Results of Indonesian Shrimp Commodity RCA in the Country Main Importer Period 2007-2014

Year	America	Japan	China	UK	France
2007	16.07	4.52	4.4	65.06	7.65

2008	18.02	4.63	17.46	65.85	7.01
2009	14.39	4.92	4.66	41.45	16.33
2010	12.81	4.50	3.31	42.60	10.98
2011	15.77	4.17	4.73	27.77	6.74
2012	21.33	4.86	5.04	17.71	8.40
2013	23.70	5.70	2.08	30.81	9.17
2014	26.60	6.24	6.68	23.40	6.88
The average	18.58	4.94	6.04	39.33	9.14

Source: UN Comtrade, 2016. Processed

Table 2 above shows that, averagely, RCA value is greater than one (RCA> 1). This indicates that Indonesian shrimp commodities in major importing countries have comparative advantages. On average, the comparative advantage with the UK is at the strongest level because it has the highest average RCA value (39.33) compared to the other four countries. It was also discovered that there is a continuous decline in the value for the countries on a yearly basis except for the United States which increase every year. However, it can be deduced that the second-largest potential export of Indonesian shrimp commodities is to the United States with an average RCA value of 18.58, followed by the French market with 9.14, then the Chinese market with 6.04. The lowest market potential was found in Japan with only 4.94.

The second analysis made use of the Gravity Model (panel data regression technique). The model selected based on Chow and

Hausman tests was Random Effect Model (REM). The estimation results gotten from the model is as shown in table 3 below:

Table 3: Estimation Results of Random Effect Models (REM) Regression

Variable	Coefficient	t- stat	Prob
Ln (GDPi)	-2,545179	-2.59	0.010
Ln (GDPj)	4,359625	7.59	0,000
Ln (price)	1,627428	2.92	0.003
Ln (pop)	1,886508	13.10	0,000
Ln (dist)	-1.311271	-4.13	0,000
Cons	-38.07114	-4.26	0,000
R-squared		0.8908	
Prob chi-square		0.0000	

Source: Estimated by Authors

Table 3 above indicates that the R-squared (R2) value is quite good, which is 0.8908. This shows that as much as 89.08 percent variation of independent variables can describe the dependent variable, while other variables outside the model explain the rest. The independent variables of the study included real GDP per capita, export prices, population and distance between countries, while the dependent variable was the export value of Indonesian shrimp commodities. All these variables have causally related to dependent variables that correspond to the theories and hypotheses that have been proposed in this study.

The real GDP per capita of Indonesia has a probability value of 0.010 with a coefficient value of -2.545179. This shows a significant effect of Indonesian GDP per capita to the value of export. When there is an increase in the country's GDP by one percent there will be a decrease in the value of its shrimp exports to importing country by 2.545 percent ceteris paribus. The results revealed that the total real GDP per capita of Indonesia has a negative and significant effect on shrimp exports. This means that an increase in the country's real GDP per capita will reduce its shrimp exports, because an increase in the purchasing power of the citizen will also increase the demand for shrimp domestically, thus, reducing the number of shrimps exported. Consequently, this reduces the market share of these products in the importing country.

The variable real GDP per capita of the importing country has a probability value of 0.000 with a coefficient of 4.359625. This shows a significant effect of real GDP per capita of the importing country to Indonesian export. A one percent increase in real GDP per capita of the importing country increases the product imported by 4,359 percent. The variable shows a positive and significant effect on the product and this implies that the higher the GDP per capita of the importing country, the higher the ability of its people to buy or consume and this subsequently increase demand for the product. Therefore, this variable must also be considered by importers when importing the commodities.

4. DISCUSSION

From the RCA analysis, it can be concluded that Indonesian shrimp commodities to the main importing countries (United States, Japan, China, Britain, and France) have comparative advantages or strong competitiveness. It was also discovered that there is an improvement in the export performance of the product in the main importing country except for the UK market. Based on the results of the gravity panel data regression analysis, it can be concluded that all the independent variables affect the shrimp' export.

The data inform negative and significant relationship found between the Indonesian GDP and the export which is consistent with the hypothesis. This is a measure of the amount of income each individual earns in the economy of the country. It can determine the purchasing power of the importing country against an export commodity. If the real GDP per capita of a country is high, it can be said that the country is a potential market for certain export commodities because the variable considers the influence of prices. The increasing of GDP will increase the domestic demand for shrimp's products and will likely to reduce the export.

Consistent with the hypothesis, the real GDP per capita of importing countries has a significant positive effect on the export of Indonesian shrimp commodity because it will add the consumption of the importing countries. It is consistent with Starck's (2012) arguments that point out the intensity of international trade will become bigger when conducted with a country with high-level GPD per capita. This

finding is in accordance with the research conducted by Starck (2012) which points out that the gravity equation shows that trade between two countries is proportional to income. The higher the level of income of the two countries, the higher the number of trades that happen between them. Thus, it can be said that international trade can be largely intensified in a country conducting transactions with a country that has a large GDP per capita.

More detail observation inform export price has significant effects, that means when the export price increased, the export value also increased. However, the results are the opposite of Lipsey's (1995) argument. Lipsey (1995) argued that the increase in the export commodity will reduce the demand for the product that will reduce the export. The findings revealed that the export price of this product has a positive and significant effect on the quantity exported which means that if there is an increase in export prices, there will be an increase in Indonesian shrimp exports. This is not in accordance with the law of demand and submission of Lipsey (1995) that increase in price for a country's export commodities will cause foreign consumers to reduce demand for these commodities, causing decline for the country's exports Starck (2012).

5. CONCLUSION

Based on the findings, this research provides an overview of the comparative advantage of the shrimp product in Indonesia and provide

supporting evidence to support the hypothesis. Indonesian GDP and GDP in the destination country have a positive effect on the exports. Additionally, supporting the hypothesis, the export price and population size have a positive and significant relationship while the distance was observed to have a negative and significant relationship with the export.

However, some areas could not be covered by this research. This research did not compare the competitiveness among different exporting countries, for example comparing with other main exporters such as China, India, Thailand and Vietnam. Additionally, this research did not cover comparative disadvantage and trade advantage. For further research, it is recommended that other methods besides Revealed Comparative Advantage (RCA) such as the Revealed Comparative Disadvantage (RCD A) and Revealed Trade Advantage (RTA) methods should be employed in analysing competitiveness levels. Subject to the data availability, the duration of observations should also be extended and other independent variables such as real exchange rates and purchasing power variables should be included. Additionally, it may worth to include the export of competing products as independent variables.

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