



## Analysis of Indonesian Crab Export Competitiveness in International Market

Harsuko Riniwati<sup>1</sup>, Nuddin Harahab<sup>2\*</sup>, T. Yohana Carla<sup>3</sup>

<sup>1</sup>Fisheries and Marine Science Faculty, Brawijaya University Malang, Indonesia, <sup>2</sup>Fisheries and Marine Science Faculty, Brawijaya University Malang, Indonesia, <sup>3</sup>Fisheries and Marine Science Faculty, Brawijaya University Malang, Indonesia.  
\*Email: [marmunnuddin@ub.ac.id](mailto:marmunnuddin@ub.ac.id)

### ABSTRACT

The purpose of this research were as follows: To know and analyze the market structure and competition of Indonesian crab, comparative advantage, competitive advantage, and crab trading specialization in international market. The analytical method used were the Concentration Ratio and Herfindahl Index, revealed comparative advantage (RCA), porter diamond theory and trade specialization index. The results showed that within 2005-2014 the market structure of fresh crabs in the international market was monopolistic which was lead by the moderate power of oligopoly market leader. The analysis results of Comparative Advantage Indonesian crabs during 2005 – 2014 period for fresh crabs highlighted a high advantage of RCA value of 21.43. Furthermore, the results of competitive advantage analysis of Porter Diamond Theory stated that the following items owned a high competitive strength; they were natural resources, demand conditions, the role of government and the role of opportunity. Next, the value of Trade Specialization Index for fresh crab and crab processed Indonesia obtained high specialization value of 0.99 and 0.97 respectively, on the other hand, frozen crab was still in its period of growth. It had 0.4 value.

**Keywords:** Indonesian Crab, Concentration Ratio, Trade Specialization Index

**JEL Classification:** F1

## 1. INTRODUCTION

Indonesia's export from 2010 to 2014 has a varied value. On average, the contribution rate of oil and non-oil export sectors during that period are 18.51% and 81.49% respectively. This condition shows that non-oil export sector as the largest foreign exchange producer for Indonesia's economic growth (Statistics Indonesia, 2016). The fisheries sector is one of non-oil exports group members that has large contribution of foreign exchange for Indonesia's economic growth. This is due to Indonesia's possession of a fairly broad oceans and its diversity of commodities in the fisheries sector which can be exported to international markets.

Crab Commodity is one of the fishery commodities that have important export value for Indonesia. Crab demand in the global market is increasing every year. In the year of 2010 the export volume is 21,537 tons of crab. 3 years later (2013), the rate leverages to 34.17 tons (Ministry of Marine Affairs and Fisheries, 2015).

Crab exports intense competition among competing countries, urges Indonesia to develop a strong competitive edge in order to survive in the international market. For a country that can improve its competitive strength, there are opportunities to increase market share within the international market and domestic market as well. The competitive strength of a country commodity is reflected in the volume of production, the product's value and volume of the commodity's exports (Ramadhan, 2011).

Indonesian crab export volumes to multiple destinations, such as United States, Japan, Hong Kong, and other countries are very fluctuated and it tends to decline. If the declining number continues to occur in the upcoming years, it may be resulted on the weakening position of Indonesian crab competitive edge.

Seeing the above problems, it is necessary to conduct a research to answer how the competitive strength of Indonesian fresh crab, frozen crab, and processed crab in the international market. The purpose of this study is to identify and analyze:

(1) the structure of the market and Indonesian crab competition in the international market, (2) the comparative advantage of Indonesian crab in the international market, (3) the competitive advantage of Indonesian crab in the international market, (4) the trade specialization of Indonesian crab in the international market.

## 2. RESEARCH METHODS

This study used time series data from the period of 2005 until 2014. Data required in this study were collected from a variety of sources - a reliable source of relevant agencies such as CPM, CTF, the Ministry of Trade, the Ministry of Foreign Affairs which were located in Jakarta, Indonesia. In addition, this research also utilized the following sites such as Un Comtrade, Trademag.org, and FAO for worldwide export data. Data required in this study was from 2005 until 2014, then the analysis was performed in January 2017.

The analytical method used in this research were as follows: The Herfindahl Index (HI) and concentration ratio (CR), revealed comparative advantage (RCA), porter theory diamond and trade specialization index.

### 2.1. HI and CR

The structure of Indonesian crab in the international market could be seen from the calculation of the HI and the CR. It was executed by calculating HI and CR in order to discover crab market structure in the international market. Herfindahl Index was a measurement tool utilized to investigate the companies' scale within a particular industry and be used also as an indicator of the amount of competition among them. HI and CR were often used to measure industrial concentration. The value of HI reflected the value of market share controlled by an enterprise within a certain industry (Ratnawati, 2011).

HI and CR could describe the shape of the market that already took place in the international crab market. The calculation of CR greatly influenced the state of the market share taken by each country inside Indonesian crab commodity composition of exports in the international market.

The first stage that should be done to analyze the market share using HI was by calculating the market share of each crab producer's country in the international market. The calculation of market shares took place by using the following formula:

$$S_{ij} = \frac{X_{ij}}{TX_j}$$

Where,

S<sub>ij</sub>: The country's market share crab *i* in the international market  
X<sub>ij</sub>: The crab export value of country *i* in the international market  
TX<sub>j</sub>: The total crab export value in the international market.

To know the market structure faced by an industry, the next step was applied by calculating the value of HI. The value of HI reflected the mastery of market share of a certain country in

the international market. The index was the sum squares of each country's market share in the international market. The formula was as follows (Cahya, 2010).

$$HI = S_{ij1}^2 + S_{ij2}^2 + S_{ij3}^2 \dots S_{ijn}^2$$

Where,

HI : Herfindahl Index

S<sub>ij 1</sub> : The country *I* market share 1 of crab commodity trading in the international market

### 2.2. CR<sub>8</sub> (Concentration Ratio for Eight the Big Firm)

CR<sub>8</sub> aimed to analyze the market structure by calculating the degree of concentration of 8 companies (sellers) with the largest market share within a market area. To understand the general picture of producers to buyers bargaining power, the formula was composed as follows:

$$CR_8 = S_{ij1} + S_{ij2} + S_{ij3} + \dots + S_{ij8}$$

Where,

CR<sub>8</sub>: The market concentration value of 8 biggest crab exporters in the international market

S<sub>ij</sub> : Crab market share of country *i* in the international market

### 2.3. RCA

This RCA calculation was obtained to analyze the comparative advantage of Indonesian crab in the international market. RCA calculation method was as follows (Li and Bender 2002); (Khan and Batra, 2005):

$$RCA = \frac{\left( \frac{X_{ij}}{X_t} \right)}{\left( \frac{W_{ij}}{W_t} \right)}$$

Where,

RCA: The competitive strength value of Indonesian crab export in the international market

X<sub>ij</sub>: The value of Indonesian crab export in the international market

X<sub>t</sub>: The total value of Indonesian exports in the international market

W<sub>ij</sub>: The worldwide crab exports value

W<sub>j</sub>: The total value of world exports.

If the country's RCA index value of a crab commodity was greater than one (RCA > 1), then the country had a comparative advantage over the world average value for the same commodity. In either way, if the value was smaller than one (RCA < 1), then the comparative advantage of a country for the commodity was low. The greater the value of the RCA index of a particular commodity, the higher the level of comparative advantage would be (Natalia and Nurozy, 2012).

### 2.4. The Porter Diamond Theory

The Porter Diamond Theory was employed to foresee the competitive advantage of Indonesian crab's competition in the international market. The Porter Diamond Theory used some

**Table 1: The classification of market structures in herfindahl index**

Market structure	Herfindahl range
Perfect competition market	< 0,1
Monopolistic market	< 0,2
Oligopoly market	0.2-0.6
Monopoly market	>0.6

factors to assess the competitive advantage level. To analyze the Theory of Diamond Porter, we should observe through various factors, namely as follows:

1. Factor condition, composed as:
  - a. Natural resources
  - b. Human resources
  - c. Science and technology resources
  - d. Capital resources
  - e. Infrastructure resources
2. Demand condition, composed as:
  - a. Composition of domestic demand
  - b. Number of requests and growth patterns
  - c. Internationalization of domestic demand
3. Related and Supporting Industries,
4. Structure, competition and corporate strategy
5. Government's role
6. Opportunity's role.

### 2.5. Trade Specialization Index (TSI)

The calculation of the trade specialty index was used to find out Indonesian crab companies' tendency: To export or import crabs. TSI calculation method was as follows:

$$TSI = \frac{(X_{ia} - M_{ia})}{(X_{ia} + M_{ia})}$$

Where,

TSI: Index of State Trade Specializations

X<sub>ia</sub>: The export value of (a) commodity from an (i) country (US \$)

M<sub>ia</sub>: The import value of (a) commodity from an (i) country (US \$)

(i) Exporting countries

(Fresh crabs = Indonesia, China, Canada, USA, United Kingdom

Frozen Crabs = Indonesia, Canada, China, USA, Russia

Refined Crabs = Indonesia, China, Philippines, Thailand, Rep. of Korea)

(a) Fresh crab, frozen crab, processed crab

The TSI index could also be used to identify the growth rate of a commodity in a trade. It was divided into 5 stages as follows:

Phase TSI	TSI index
Introduction phase	-1.00-0.50
Import substitution stage	-0.51-0.00
Growth stage	0.01-0.80
Maturity stage	0.81-1.00
Reimporting stage	1.00-0.00

Source: Ministry of trade, 2016

## 3. RESULTS AND DISCUSSION

### 3.1. Crab Market Structure in International Market

The number of exporting countries that exported fresh crabs in the last 10 years or from 2005 to 2014 varied annually between 63 and 71 countries. The values of fresh crab HI did not experience a significant change due to composition value of HI was in the range of 0.104 to 0.114, with the average value of HI was 0.103. It showed a low level of concentration that lead to monopolistic market structures Table 1.

The values obtained from CR<sub>8</sub> ranked 8 largest state exporters of crabs in the world. Over the last 10 years CR<sub>8</sub> fresh crab was in the range of 72.21 percent to 84.38 percent with the average value of 77.54 percent. The market type structure for CR<sub>8</sub> with a ratio of 70-84 per cent was an oligopoly market structure type with medium concentration. It could be concluded that from 8 fresh crab exporting countries with the average of 77.54 percent value were having a tendency to dominate the market more than 70 percent of total market share for 10 years. Furthermore, it also portrayed that fresh crabs were in a moderate market concentration. Because the CR<sub>8</sub> value of fresh crabs tended to be inside oligopoly market for the last 10 years, thus it could be stated that the fresh crabs were in an oligopoly market structure. Therefore, the most suitable form the market was monopolistic market type with moderate power of oligopoly market leader.

Frozen crab commodity market showed monopolistic market structure inclined to be monopolistic. It could be seen from the value of the HI that were relatively low, ranging up from 0.168 to 0.253 with the average number was 0.208 and the number of involving countries were big. The number of countries exporting frozen crabs from 2005 until 2014 ranged from 78 to 87 countries.

The indication level of CRs for 10 years which was shown by the value of CR<sub>8</sub> was in the range of 80.94 per cent until 85.00 percent with the average number of 82.97 per cent. It displayed that frozen crab commodity was in the market structure of oligopoly competition, however, if the eight largest companies controlled the market by the number of 80%, then, it could be said that it was strong market. It could be concluded that the shape of the frozen crab market in this international market was a monopolistic market structure with a strong leader of oligopoly market forces.

The commodity market of processed crab value could be seen from the value of the HI which was ranged from 0.168 to 0.235 and the average number was 0.208. The total number of involving countries for 10 years was likely to be slightly changed between 60 and 63 countries. Seeing the result, it could be affirmed that the concentration inclined to be low.

The CR<sub>8</sub> value on the processed crab ranged from 84.96 percent up to 88.81%. In other words, it was 86.85 percent on average and for the last 10 years, it kept increasing. The processed crab could be perceived as commodities that had a contrastive values of low HI value and high CR<sub>8</sub> value, thus, it could be concluded that processed crab commodity market structure was monopolistic market with strong power of oligopoly market leader.

### 3.2. The Comparative Advantage of Indonesian Crab in the International Market

Indonesian State RCA index for fresh crab commodity had high average value. It was 21.43. This indicated that Indonesia's frozen crab commodity had a comparative advantage and powerful competitive strength. Indonesia was ranked first of nine largest exporting countries.

High RCA Index was enough to indicate that Indonesian fresh crab Indonesia had powerful competitive strength in the international market, and Indonesia could be said as the largest exporter of fresh crab worldwide.

The Indonesian RCA Index of frozen crab commodity from 2005 to 2009 and from 2011 to 2014 above indicated that Indonesia had a comparative advantage and powerful competitive strength, but in 2010, the RCA of frozen crab dropped to 0.43 denoting that Indonesia's frozen crab in 2010 did not have a comparative advantage. However, when took a closer look on the average percentage from 2005 until 2014, the value was 2.47. It signified that Indonesian frozen crab had a comparative advantage and competitive strength in international markets.

Based on Indonesia's RCA index, the processed crab commodity had a comparative advantage and high competitive strength. The RCA index of processed crab commodity range value started from 4.87 until 18.46. It was 10.78 on average. The processed crab sat on the 3<sup>rd</sup> place after Vietnam that had 10.79 as the average value. On the first place, there was Philippines with average value of 10.82. The strength of competitiveness and high market share of processed crab commodities in the international market depicted the increasingly worldwide tight competition of processed crab commodities. Especially for Indonesia, it should develop further its potential in order to obtain a positive impact of comparative advantage in the international market. Thus, efforts were required to manage the following things: To regulate crab exports; to increase market share especially for frozen and processed crab commodities; and to leverage the competitive strength of fresh, frozen and processed crab commodities.

### 3.3. The Competitive Advantage of Indonesian Crab in International Market

#### 3.3.1. Condition factor

##### 3.3.1.1. Natural and Artificial Resources

Crabs were easily found in all condition of marine waters and coastal areas in Indonesia. However, the sustainability of the crab should be maintained, therefore, crab breeding could be use also as one of sustainability attempts through a couple of pool models despite the traditional of currently use aquaculture technology.

##### 3.3.1.2. Human Resources

There was a big quantity of human resources in Indonesia but unfortunately, the adequate quality of human resources was hard to find. According to Bappenas (2005), several things reflected the quality of human resources: (a) the living and developing mentality of a community (b) assimilation strength and technology absorption, (c) technical, entrepreneurial and management capabilities, and (d) The ability of lobbying or negotiation.

Therefore, the human resource development efforts should be improved, especially in the utilization of natural resources and technology so that it could run well in relation to the main export activities of crab commodities.

##### 3.3.1.3. Science and Technology Resources

The fishing technology employed was the traditional kind of technology. There was a lack of sufficient knowledge on quality improvement; the environmental quality standards awareness for export commodity. For example, famers should not catch crabs that were laying their eggs and crabs that owned carapace less than 15 cm long.

##### 3.3.1.4. Capital Resources

Indonesian government had formulated a sustainable financing policy through the existence of a President's Instruction No. 7 in 2016. On the accelerating development of the national fishing industry, including the launching of net cards and people's business credit.

##### 3.3.1.5. Infrastructure Resources

The infrastructure existence in the coastal areas was still poor. For example, the installation of clean water network, electricity, roads and transportation were remained deficient, especially in the countryside. According to Iswandi (2015) infrastructure became the major milestone in sustaining various sectors of the coastal area. Thus, low quality of infrastructure would be followed by the slow pace of coastal cities' development. Although, there were a lot of fishing ports in Indonesia which were existed in every regency.

#### 3.3.2. Conditions of Demand

Domestic demand was quite good. The structure of crabs' demand segments selling points were commonly found at the following places: Supermarkets and traditional markets; and hotels and restaurants. The consumer also owned high taste of crab. Crab's domestic demand was quite high (5,131,239 kg) based on UN Comtrade Data in the year of 2016 but the local market was quite unstable for the last 5 years. On the contrary, the total number of export market demand kept increasing every year.

##### 3.3.2.1. The Role of Government

The government's roles in improving the competitive strength of Indonesian crabs were quite complex. The government served as a motivator, regulator, and facilitator in the development of fishery commodities, especially for crab commodities by establishing several policies. Government policy was an instrument to develop system and business of Indonesian crab. Government policies were made to create a conducive business climate that owned a coordinated and consistent nature protection policies. The role of government was adequate, for instance there were several programs provided to help fishermen, such as counseling and financial aid.

##### 3.3.2.2. The Role of Opportunity

Indonesian crabs' products, either in the form of fresh, frozen and processed crabs, still held a great chance to grow in the international market. In the current era of free trade, there were many opportunities for Indonesia to take a stand and develop

worldwide crab market. However, each country owned different rules. such as Japan, the United States and the European Union. Therefore, Indonesia should obey the rules of the particular country's regulations to fulfill the need of export procedures or requirements to Japan, USA and EU. Indonesia may also seek new market in the other countries for exporting crabs.

#### 4. INDEX OF TRADE SPECIALIZATIONS

Based on the value of trade specialization index of Indonesian fresh crab and processed crab which was shown during the year of 2005 until 2014, the remaining avaregae value stayed at the point of 0.99 and 0.97. This was a very high number of value where Indonesian fresh crabs were ranked first among other exporting countries. Indonesian fresh and processed crabs had reached a level of export maturity for export and possessed an excellent competitive strength.

Implicitly, the Trade Specialization Index was considering also the demand and supply side where export was synonymous with domestic supply and imports was meant as domestic demand. Or in other words, it was in accordance with international trade theory, the Net of Surplus Theory, as exports of goods occurred when there was a surplus on goods in the domestic market. Yet, the value of trade specialization should be in the range of -1 to +1. If the value was positive until it reached 1, then the commodity was said to have a strong competitive strength or the country paid a good concern on its role as an exporter of the commodity (domestic supply was greater than domestic demand). On the other hand, if the value was negative, the competitive strength inclined to be low or the country was having a tendency to be an importer (domestic supply was less than domestic demand).

Despite the fact that the value of the Specialization Index of Indonesian frozen crabs' trade from 2005 to 2014 had been fluctuated, and reached its lowest point in the year of 2012 and 2013 by being at the low competitiveness stage and requiring imports from other countries, but in the following year Indonesia had started to rise. Although, it still required import. It could be concluded that on the average Indonesian frozen crabs' commodity from 2005 to 2014 had 0.4 value of number. The facts had been clarified that Indonesian frozen crabs owned quite a potential of competitive strength or it could be implied that it was at a growth stage indicating the Indonesian crabs' offer was greater than its demand.

#### 5. CONCLUSION

1. Based on the calculation HI and CR for the last 10 years, it was discovered that fresh crab market of the international market had a monopolistic market structure with a moderate concentration of oligopoly market power leader. The frozen and processed crabs in the international market had the similar monopolistic market structure with powerful oligopoly market power leaders.

2. Based on the results of the RCA, the commodity of Indonesian fresh crab, frozen crab and processed crab between the year of 2005 to 2014 had a high comparative competitive strength.
3. The results of the analysis of the competitive advantage using the Porter Diamond Theory stated that Indonesian crab had a good enough competitive advantage, covering natural resource factors, the demand conditions, government's role and the role of chance.
4. Based on calculations of Trade Specialization Index of Indonesian fresh crab and processed crab were already in the maturity stage and the competitive strength was excellent. As for the Indonesian frozen crab, it had 0.4 average value indicating that it was in the growth stage.

#### 6. SUGGESTIONS

1. For entrepreneurs who are engaged in the fisheries sector, it is better for them to start breeding the crab as export commodity so that the conservation of Indonesia's crab will stay sustained for long period. In addition, it is also best for them to start the production using the environmentally friendly high technology.
2. The government is expected to provide strategic services related to market forces, such as looking for market share opportunities from crab's importing countries; the fulfilment of the proper standardization and the improvement of coastal areas infrastructure.

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