Competitiveness identification of fisheries export in Indonesia

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Abstract. Since the implementation of AFTA in 2003 and ACFTA in 2004, the fisheries sector is becoming discussed increasingly. AFTA and ACFTA is the door for international trade, especially import and export activities in Indonesia specifically in the fisheries sector. Besides, this sector is one of the labour-intensive sectors that absorbs a significant workforce. To prevent decreasing in export fisheries, competitiveness can be used as an indicator of trade level. This paper analysed the competitive and comparative advantage of Indonesian fisheries products for export destination country such as United States, Japan, ASEAN, China, and the European Union. Data used in this study were retrieved from BPS and World Bank between 2012 to 2017. This paper used several measurement methods to capture comparative advantage measures namely Trade Specialization Index (TSI), Revealed Comparative Advantage (RCA) and Export Product Dynamics (EPD) methods. If fisheries products prove high competitiveness, it can be expected to continue to exist and consistently grow. The results of this study indicate that competitiveness in fisheries sector still increases and encourages domestic production, with the end goal in public welfare. So that in the future, fisheries sector become one of the leading sectors in Indonesia.

1. Introduction

International trade is trade with residents or the government of a country with other countries based on agreement between countries to achieve national development goals that are supported by resources, technology, and accessibility of advanced transportation. A country must have competitive advantage to compete in the international arena. Indonesia in terms of international trade has followed several agreements between countries such as the ASEAN-China Free Trade Area (ACFTA) and the ASEAN Free Trade Area or AFTA. ACFTA is an agreement between ASEAN countries member and China to create a free trade area by removing or reducing barriers. With ACFTA agreement, the members can trade in goods both with tariffs or non-tariffs, increasing service market access, investment regulations and provisions, as well as improving aspects of economic cooperation to encourage economic relations in order to improve the welfare of the people of ASEAN and China. Whereas Indonesia's goal in participating in the AFTA is to eliminate tariff limits between Southeast Asian countries with a vision of integrating the ASEAN economy into a production base and creating a regional market, which will be pursued through the elimination of intra-regional tariffs and non-tariff limits [1].
International trade requires countries to have a competitive advantage or comparative advantage, or have both advantages. Comparative advantage occurs if a country specializes in the production and export of commodities that have smaller absolute losses and imports commodities that have greater absolute losses [2]. Competitive advantage or competitiveness is the ability of a commodity to enter foreign markets and the ability to be able to survive in the market, in the sense that if a product has competitiveness then the product is the most interesting by consumers.

The fisheries sector is one of the sectors that has a strategic role in national development. Judging from the potential of natural resources, Indonesia is known as the largest maritime country in the world because it has a relatively large potential of fishery resource wealth, and also absorbs a lot of labors, ranging from fishing, cultivation, processing, distribution and trade activities [3].

Besides that, from the growth rate in the fields of agriculture, forestry and fisheries in Indonesia in 2017-2018 with the base year 2010, the growth rate is tended to increase except in the fisheries sector which experienced a decline. Figure 1 shows that the growth rate of fisheries is still higher than others sector which is agriculture, livestock and forestry, and logging. In 2018 the fields of agriculture, forestry, and fisheries contributed to GDP at current prices of 12.81 percent or decreased compared to the previous year. However, when compared to other sub-categories or sectors, the growth rate of fisheries has not yet been ranked in the top 5 of the high growth rates in Indonesia.

Figure 1. The Growth Rate of Agricultural, Forestry and Fisheries Business Fields Based on Constant Prices in Indonesia 2017-2018 (in percent)

Fisheries production in Indonesia for 1999 – 2017 tended to increase in both aquaculture and fish capture. In Figure 2 shows that aquaculture production is higher than fish capture, for example, in 2017, 70 percent of fishery production is dominated by aquaculture, and the rest is 30 percent fish capture production. Aquaculture such as marine culture, brackish water pond, freshwater pond, cage, floating cage net, sticking net, paddy field. And fish capture such as marine fisheries and open water.
Along with the increase in fisheries production, fish consumption in Indonesia also has increased every year. The increase in fish consumption was allegedly the Government's appeal through the Indonesian Ministry of Maritime Affairs and Fisheries related to the Fish-Eating Movement or fond of eating fish. Fish consumption that is classified as high is more than 31.4 kg / cap found in Aceh, North Sumatra, Riau, Jambi, South Sumatra, Riau Islands, Bangka Belitung Islands, West Kalimantan, North Kalimantan, East Kalimantan, Central Kalimantan, South Kalimantan, South Sulawesi, West Sulawesi, Central Sulawesi, North Sulawesi, Gorontalo, North Maluku, Maluku, West Papua. The provinces in Java, Bali and Nusa Tenggara are included in the medium consumption category, which is 20 – 31.4 kg / cap.


Seen from the fish resource potential figures (MSY), the graph tends to increased (Figure 3). The Maximum Sustainable Yield (MSY) is a measurement tool for determining boundaries of fisheries variables to determine whether an area still allows fisheries management or not at all. Or in other words, MSY is the biggest catch that can be produced from year to year by a fishery. It means that if the MSY number increases each year, it’s likely that Indonesia has potential in the fisheries sector.

The value of Indonesia’s exports to the main destination countries of the fisheries sector has increased. For example, in 2015 Indonesia’s fisheries sector exports reached 1,342.61 million USD, and in 2016 it increased to 1,460.31 million USD. The main export destination countries for the fisheries sector include the United States, Japan, ASEAN, China, the European Union, and others. In international trade, Indonesia’s fisheries sector considered as for its potential, which can then have a comparative and competitive advantage when viewed from its export value.

HS 03 code fishery products (fish, crustaceans, soft animals, aquatic invertebrates) in Indonesia have ASEAN-China level competitiveness in 2000-2008, but the comparative advantage still relies on fresh fish products whereas for products that have added value they lack comparative advantage so they lack competitiveness [4]. The competitiveness of the fisheries sector is not evenly distributed across all fisheries commodities but only in a few commodities and depends on the main export region. In line with research conducted by Mufa’ah [5], shrimp commodity in Indonesia is included in a strong export competitiveness where the factors that influence it are labour, land, government programs, the amount of production, capital, product diversification, environment, human resources, materials standards, seeds, demand, prices, competitors, standards and quality so that the strategies taken to increase the competitiveness of shrimp exports are emphasized by increasing the amount of production to meet export demand from other countries. However, Puput Ayu Pudyastuti [6] found that the Indonesian shrimp commodity is in the position of falling star, which means that the Indonesian shrimp commodity has a competitive advantage but is weakly competitive in the European market in 2008 to 2016. The purpose of this study is to map the competitiveness of the fisheries sector in Indonesia. This research will be conducted through several steps. First method is using the Trade Specialization Index to determine the position or stages of the development of fishery products. The next step is using revealed comparative advantage (RCA) to find out the comparative advantages of Indonesian fishery products in the export destination market. The final step is using Exports Dynamic Product (EPD) to measure the competitive advantage of Indonesian fishery products in the export destination market.

2. Methodology

This study uses secondary data in frame time 2012-2017. The data used in the form of export value of Indonesian fishery products and the Asian Continent obtained from the UN Comraded, World Bank, Food and Agriculture Organization of the United Nations website, and BPS (Indonesian Central Statistics Agency), the Indonesian Ministry of Maritime Affairs and Fisheries (KKP). Data analysis techniques used in this study were:

1. Trade Specialization Index (TSI)

The Trade Specialization Index is a measure used to analyse the position or stage of development of a product so that a country seen as an exporter or importer. Mathematically TSI is formulated as follows:

\[
TSI = \frac{X_{it} - M_{it}}{X_{it} + M_{it}}
\]  

Note:
Xit: Commodity Export Value i (Rice) in year t
Mit: Commodity Import Value i (Rice) in year t
2. Revealed Comparative Advantage (RCA)
RCA is one of the methods that can be used to measure a country's comparative advantage in world markets. In this analysis the RCA of rice commodities in Indonesia will be counted as a whole. The RCA formulated as follows:

$$RCA_{ijt} = \frac{\frac{X_{ijt}}{W_{ijt}}}{\frac{X_{jt}}{W_{jt}}}$$

Note:
Xijt: Commodity Export Value i (Rice) by Country j in year t
Xjt: State Export Value j in year t
Wit: World Export Value of Commodities i (Rice) in year t
Wt: World Export Value in t

3. Export of Dynamics Products (EPD)
Export Dynamic Product is an indicator that can be used to measure the market position of a commodity in a country with a specific market destination. The EPD method is used to measure the competitive advantage of a commodity. EPD can show dynamic movements or rapid growth in a commodity. By measuring competitiveness using this EPD, if the growth of commodities in a country is above the average value, then this situation can continue for the long term and allow these commodities to become an important source of state revenue in a country (Bappenas, 2009) [7]. EPD is calculated as follows:

X-Axis: Growth in Indonesia's export market share

$$\frac{\sum_{t=1}^{T}(\frac{X_{ij}}{W_{ij}})t \times 100\% - \sum_{t=1}^{T}(\frac{X_{ij}}{W_{ij}})t-1 \times 100\%}{T}$$

Y-Axis: Growth in the market share of Indonesian products or commodities

$$\frac{\sum_{t=1}^{T}(\frac{X_{t}}{W_{t}})t \times 100\% - \sum_{t=1}^{T}(\frac{X_{t}}{W_{t}})t-1 \times 100\%}{T}$$

Note:
Xij = The value of Indonesia's CPO commodity exports to the importing country
Xt = The total export value of Indonesia's exports to the importing country
Wij = The export value of the world CPO commodity is the importing country
Wt = The total value of world exports to the importing country
T = Number of years analysed

Table 1 explains the four general decompositions of export performance (related to market share positions). The four decompositions of these indicators of trade competitiveness applied to a variety of constructions of quantitative indicators.
Table 1. Market Position Matrix EPD

| Share of Country’s Export in World Trade | Share of Product In The World |
|-----------------------------------------|-------------------------------|
| Rising (Competitiveness)                | Rising (Dynamic)              |
| Rising (Non-Competitiveness)            | Falling (Stagnant)            |
| Rising Star                             | Falling Stars                 |
| Lost Opportunity                        | Retreat                       |

The explanation about EPD Market Position Curve is as follows:

a) The rising star position is ideal and has the highest position in exports. The rising star position shows that the country gained additional market share in products or commodities that have fast-growing or fast-growing products.

b) Lost Opportunity Position, this is related to the dynamic position of product or commodity market share decline. This situation illustrates where a country’s total export market share has decreased and has a negative value or more than 0 (> 0) while the market share of a product or commodity has a positive growth of more than 0 (> 0). This position is the most undesirable position, because in this position there is a decline in market share in dynamic total exports.

c) Falling star position is a condition where the total export market share of a country experiences a positive growth of more than 0 (> 0) while the export market share of a product or commodity has decreased which has a negative value of more than zero (> 0). This position is a better position compared to the lost opportunity position, because in this position the total export share is still experiencing positive growth despite a decline in the export share of a commodity.

d) Retreat position is a position where the share of exports and total exports of a country experiences negative growth and is worth more than 0 (> 0). This position is a position that is not competitive and tends to experience stagnant growth.

The explanation above can be illustrated in Figure 4.

Source: Esterhuizen 2006 in Bappenas 2009

Figure 4. EPD Market Position Curve
3. Result and Discussion

The result of the calculation is as follows:

1. Trade Specialization Index (TSI)
   TSI is used to calculate a country's trade specialisation by analysing the development position of a commodity by describing whether a country tends to be an exporter or importer. TSI value is positive (between 0-1), meaning that the Indonesian fisheries sector is said to have strong competitiveness and has a tendency as an exporter of the fisheries sector or domestic supply is greater than domestic demand. If the TSI value is negative (<1 to less than zero or ≥-1), it means that the Indonesian fisheries sector is said to have weak competitiveness and has a tendency as an importer of the fisheries sector or domestic supply is smaller than domestic demand.

![Figure 5. Trade Specialization Index (TSI) Fisheries Sector in Indonesia 2000-2016](image)

Figure 5 shows that the Indonesian fisheries sector has strong competitiveness with an average of TSI in 2000-2016 of 0.73. The TSI value from 2000 to 2016 is in the range of 0 – 1 or positive, meaning that the fisheries sector in Indonesia is said to tend as an exporter and or domestic supply is greater than domestic demand. Indonesia has an ISP value of almost 1, and this is possible because exports of the Indonesian fisheries sector tend to increase (Figure 6). This increase is also supported by the government’s efforts to provide legal umbrella in the fisheries sector, for example the Indonesian Minister of Maritime Affairs and Fisheries Regulation No. 35 of 2015 concerning Human Rights Systems and Certification in the Fisheries Business, and Regulation of the Indonesian Minister of Maritime Affairs and Fisheries No. 42 of 2016 concerning Sea Work Agreements.
The value of exports is higher than the value of imports in Indonesia in 2000-2016, for example in 2016, the difference in the value of exports was reduced by imports worth 466,420,000 USD. Luckily, the value of imports tends to increase, the amount of exports is still higher.

Indonesia consists of thousands of islands with quite long beaches that would be able to increase the production and export of the fisheries sector. Related to the performance of capture fisheries production, Phillips et al. [8] explains that of the nine fisheries management areas, most of which are already overfishing such as in the Malacca Straits and the Java Sea. Indonesia's obstacles in the development of the fisheries sector, for example, overfishing and the rise of illegal fishing. Meanwhile in the aquaculture sub-sector, Indonesia has potential and constraints. The potential of Indonesia, for example, the availability of vast land, the high number of fish species, the availability of human resources. While obstacles in the fisheries sub-sector, for example, are capital problems. These constraints cause the existing potential cannot be used optimally [9].

Problem in fisheries sector mostly comes from the fisher. The problems and strategies or policies related to fishermen, for example fluctuating of fuel prices, low rate of fishermen education level, pollution of the marine ecosystem. While strategies or policies for increasing the welfare of fishermen, for example, provide fishing capital assistance accompanied by the provision of knowledge and skills, increase the number of gas stations in fish landings, enforce marine environmental sustainability laws, prioritise the availability of electricity in Eastern Indonesia [10].

According to the publication of EC Facts and Figures in Common Fisheries Policy in 2016 [11] shows that Indonesia got second ranks in the World Top Marine Catch Producers, with a contribution of 6.54 percent. This position is below China which got in the first ranks with a catch contribution of 17.70 percent. Furthermore, research from Rochwulaningsih [12] revealed that several pillars promoted by the President related to the development of the fisheries sector in Indonesia included rebuilding maritime culture, maintaining and managing marine resources. In the other hand, Pomeroy [13] states that the proportion of the workforce in fisheries has doubled in Asia since the 1970s, it is estimated that more than 30 million in ASEAN countries and 60 million work in the fields of manufacturing of fishing gear, bait preparation, etc.
2. Revealed Comparative Advantage (RCA)

The export competitiveness of Indonesia's fisheries sector to the Asian market uses the RCA (Revealed Comparative Advantage) approach. The Indonesian fisheries sector can be said to have a comparative advantage if the export value of the Indonesian fisheries sector in Asia in Indonesia's total exports is greater than the share of the export value of the Asian fisheries sector in total Asian exports. An RCA value of $>1$ means that the country has a comparative advantage above the world average, so that the sector has strong competitiveness. If the RCA value is $<1$ means the country has a comparative advantage below the world average or in other words the sector has weak competitiveness.

![Figure 7. Revealed Comparative Advantage (RCA) Fisheries Sector in Indonesia 2000 – 2016](image)

Based on the calculation of the RCA value, it’s obtained that Indonesia has a comparative advantage for the fisheries sector during 2000 – 2016 because it has an RCA value greater than one (RCA $>1$). The RCA value of Indonesia's fisheries is high in line with fisheries sector exports to the Asian market. This result supported by research from Duggan [14] which revealed that the Moluccan Handline Yellowfin Tuna is the first fishery product that has been certified at Fair Trade USA in 2014, then in 2015 Yellowfin Tuna fisheries in Central Sulawesi also submitted the certification. Furthermore, research by Fahmi [15] states that eighty percent crab (blue swimming crab and almost all blue swimming crab) of US comes from Indonesia, and Indonesia has the most competitive crab RCA index in the US market. According to Sunoko [16] states that Indonesia should improve some aspects, especially in the government capacity building (such as inter-agency coordination, infrastructures and facilities, human capacity) and marketing (such as increase tuna quality, monitoring, control and surveillance).

3. Export of Dynamics Products (EPD)

EPD is intended to provide an overview related to the level of competitiveness of a country's product or export sector competitively. On the other hand, EPD is also used to analyse a product or export
commodity that has a dynamic or stagnant phenomenon. The EPD method consists of a matrix that is used to place dynamic export products or sectors into four categories: rising star, lost opportunity, falling star, and retreat. Classification to four categories was determined by calculating the average growth of product or sector exports and the average growth of a product or sector.

Table 2. Export Product Dynamic (EPD) of the Indonesian Fisheries Sector in Destination Countries in the Asian Market in 2000-2016

| Year | Average Total Export Growth | X-Axis | Average Export Growth of the Fisheries Sector | Y-Axis | EPD |
|------|-----------------------------|--------|---------------------------------------------|--------|-----|
| 2000 | -                           | -      | -                                           | -      | -   |
| 2001 | -0.00005875                 | -      | -0.00005229                                 | -      | Retreat |
| 2002 | 0.00007291                  | +      | -0.00010111                                 | -      | Falling Star |
| 2003 | -0.00008604                 | -      | -0.00010041                                 | -      | Retreat |
| 2004 | -0.00004365                 | -      | -0.00015364                                 | -      | Retreat |
| 2005 | -0.00011969                 | -      | -0.00001550                                 | -      | Retreat |
| 2006 | -0.00021256                 | -      | -0.00002182                                 | -      | Retreat |
| 2007 | 0.00014819                  | +      | -0.00006482                                 | -      | Falling Star |
| 2008 | 0.00019292                  | +      | 0.00002622                                  | +      | Rising Star |
| 2009 | 0.00013679                  | +      | 0.00007196                                  | +      | Rising Star |
| 2010 | 0.00006410                  | +      | 0.00016397                                  | +      | Rising Star |
| 2011 | 0.00014951                  | +      | 0.00007904                                  | +      | Rising Star |
| 2012 | 0.00064357                  | +      | -0.00015406                                 | -      | Falling Star |
| 2013 | -0.00051341                 | -      | -0.00009244                                 | -      | Retreat |
| 2014 | -0.00024543                 | -      | -0.00007092                                 | -      | Retreat |
| 2015 | 0.00010213                  | +      | -0.00005196                                 | -      | Falling Star |
| 2016 | -0.00020874                 | -      | 0.00001135                                  | +      | Retreat |

By using EPD result shows in Table 2, the result shows that fisheries sector in 2000 – 2016 tends to decrease even though in some years it has increased which is in the position of rising star or fast-growing product for 4 periods of 2018 – 2011. That position indicates an increase in the total export market share but is not available an increase in the market share of the fishery sector. Indonesia's export market share has experienced positive growth, but the Indonesian fisheries sector has not experienced growth and has a negative value or tends to stagnate. The value of Indonesia's exports from 2000 to 2016 tends to increase, but after 2012 Indonesia's export value has decreased
In line with the decline in the export value of the fisheries sector, the number of exports of the fisheries sector in Indonesia in several years during 2000 – 2016 also declined.

The Globefish Highlight report (FAO, 2010) in a study conducted by Natalia [9] states that Vietnam, China, Bangladesh, and Indonesia have decreased shrimp production. The decrease was partly due to factors related to weather. As a result of this decline, shrimp supply to the global market has become limited, which also has an impact on shrimp supply in the European market. In France, Indonesia's shrimp commodity is in a "rising star" position, meaning that Indonesian shrimp commodities in France have gained additional market share in commodities that have dynamic growth or fast-growing products due to an increase in shrimp exports to France by 77.3 percent in 2010.

4. Conclusion

From the results of the analysis of the Trade Specialization Index (TSI) of the Fisheries Sector in Indonesia in 2000 – 2016 it can be illustrated that the Indonesian fisheries sector has strong competitiveness with an average of 2000 – 2016 TSI of 0.73. The results of the Revealed Comparative Advantage (RCA) analysis shows that Indonesia has a comparative advantage for the fisheries sector during 2000 – 2016 because it has an RCA value greater than one. Moreover, the results of the Export Product Dynamic (EPD) analysis can be described that the fisheries sector is in a "falling star" position.

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