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Competitiveness analysis of Indonesian seaweeds in global market

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Competitiveness analysis of Indonesian seaweeds in global market

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Abstract. Comparative advantage is an indicator of competitive level of a country in global market. Indonesia has an abundant seaweed production that has been exported to international market. This study aims to estimate the competitiveness of Indonesian seaweed in global market. This study employs secondary data from UN Comtrade, BPS, and fisheries statistics of Indonesia. Data were analyzed by Revealed Comparative Advantage (RCA) to examine index of competitiveness, export product dynamics (EPD) to describe potential market destination in global market. The findings indicate that competitiveness of Indonesian seaweeds was mostly strong in some destination countries in global market. Furthermore, Indonesian seaweeds had the best benefit (rising star) in global market and also acquired falling star, lost opportunity and retreat market shares. Some destination countries were potential to be developed and some were optimistic. Therefore, Indonesia needs to strengthen collaboration with some countries that have a potential market on seaweed products including China, Japan, Rep of Korea and Singapore. Furthermore, Indonesia needs to expand export market to some African countries since Indonesia had only few market destinations in Indonesia.

1. Introduction

Indonesia is the second largest seaweed producers following China, and it contributed to almost 38.7% (11.6 million tonnes) of global seaweed production in 2016 [1]. The main seaweed species farmed in Indonesia are *Eucheuma spp., Kappaphycus spp.* and *Gracilaria spp* [2]. Given this background, Indonesia has the opportunity to play a leading role in the global seaweed market. In Indonesia, seaweed is the largest commodity and it contributed to almost 70% on aquaculture production [3]. However, the performance of Indonesian seaweeds in global trade is below countries with less production volumes [4]. Inefficiency and few numbers of seaweed processing facilities are constraints on the low export value of Indonesian seaweed. Uncertainties in yield, quality, price, and infrastructure in one part of the supply chain may affect the whole chain [5].

Indonesia needs to improve competitiveness of seaweed products to increase benefits from global trade. A higher competitive advantage would increase export value so that foreign exchange would improve and fisheries actors especially seaweed farmers would intensify their incomes. Hence, opportunities and challenges of seaweed market need to be examined to enhance the comparative advantage of Indonesian seaweeds in global trade.

Demand of seaweeds in global market is expected to continually increase in the coming years due to increase of human consumption and improvement of cosmetics and pharmaceutical. For instance, UN

Comtrade shows that export of cosmetics and pharmacies increase steadily from 2015 to 2019. Dairy products are currently the market leaders for high-value seaweed products, especially for those containing carrageenan. Those improve demands for seaweeds will drive exporter countries to improve their comparative and competitiveness levels. Therefore, this paper aims to examine comparative advantage, competitiveness position and market development strategy of Indonesian seaweeds in global market.

2. Methods

This study employs secondary data from UN Comtrade. The data consists of all seaweed commodities traded (export) to all countries recorded on UN comtrade annual data from 2015 to 2019: HS 121221 (Seaweeds and other algae; fit for human consumption, fresh, chilled, frozen or dried, whether or not ground), HS 121229 (Seaweeds and other algae; not fit for human consumption, fresh, chilled, frozen or dried, whether or not ground), HS 130231 (Mucilages and thickeners; agar-agar, whether or not modified, derived from vegetable products), HS 130239 (Mucilages and thickeners; whether or not modified, derived from vegetable products, n.e.c. in item no. 1302.3), and HS 262190 (Slag and ash n.e.c. in chapter 26; including seaweed ash (kelp) but excluding ash and residues from the incineration of municipal waste). This paper employs Revealed Comparative Advantage (RCA) method to measure competitiveness of Indonesian seaweed products in global market. RCA is a ratio between market share of a certain commodity in the global market and exports share. Accordingly, following paper [6] Revealed Comparative Advantage (Balassa 1965) can be defined as:

$$RCA = \frac{X_i^j/X_t^j}{X_i^w/X_t^w} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

where X_{ij} represents the export value of Indonesian seaweeds in destination country j, X_{tj} represents total export value of Indonesian seaweeds in destination country j, X_{iw} represents export value of world Seaweeds in destination country j, and X_{tj} represents total export value of destination country j. This study also used the Export Product Dynamic (EPD) method as one of the indicators to portray level of competitiveness. In this paper, the indicator depicts market position of Indonesian seaweeds for some destination countries. An EPD matrix consists of market appeal and business strength information which results in characters of a products. Four positions are described with different characteristics as portrayed in Figure 1 below.
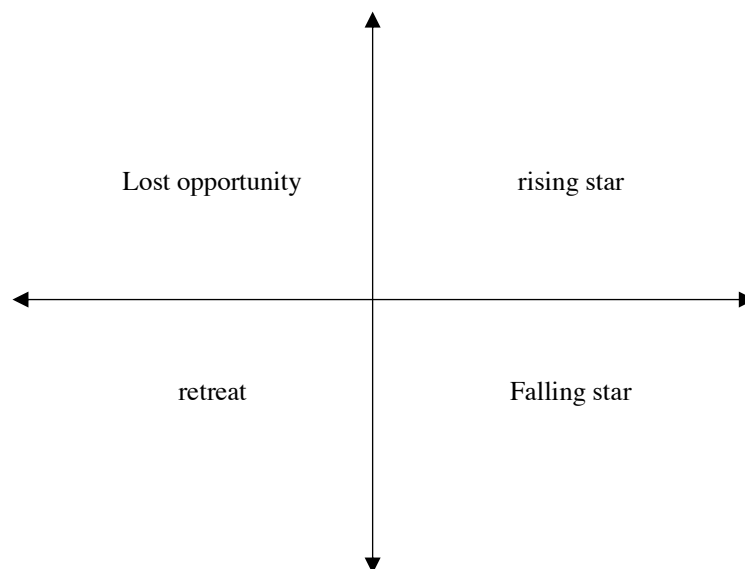

Figure 1. Market appeal and business strength in EPD matrix.

The competitiveness position of seaweeds in destination countries commodity were placed in one of four quadrants depends on market appeal and business strength of the commodity in destination countries, as Estu et al (2019) examined:

X axis is the growth of export market appeal=

$$\frac{\sum_{t=1}^{T}\left[\left(\frac{X_{ij}}{W_{ij_t}}\right)x100\%-\left(\frac{X_{ij}}{W_{ij_{t-1}}}\right)x100\%\right]}{T} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(2)}$$

Y axis is the growth of export market appeal=

$$\frac{\sum_{t=1}^{T}\left[\left(\frac{X_t}{W_{t_t}}\right)x100\%-\left(\frac{X_t}{W_{t_{t-1}}}\right)x100\%\right]}{T} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3)}$$

Where X_{ij} represents the export value of Indonesian seaweeds in destination country j, X_t represents total export value of Indonesian seaweed in destination country j, W_{ij} represents export value of world Seaweeds in destination country j, W_t represents total export value of destination country j, t represents year t, and T represents number of years the data used in analysis.

To determine potential market development of Indonesian seaweed in destination countries, this study employs the X-Model of Potential Export Product method. This method is used to depict cluster of destination countries which had potential market development by considering competitiveness (RCA) and market position (EPD). X-Model of potential export destination is shown in Figure 2.
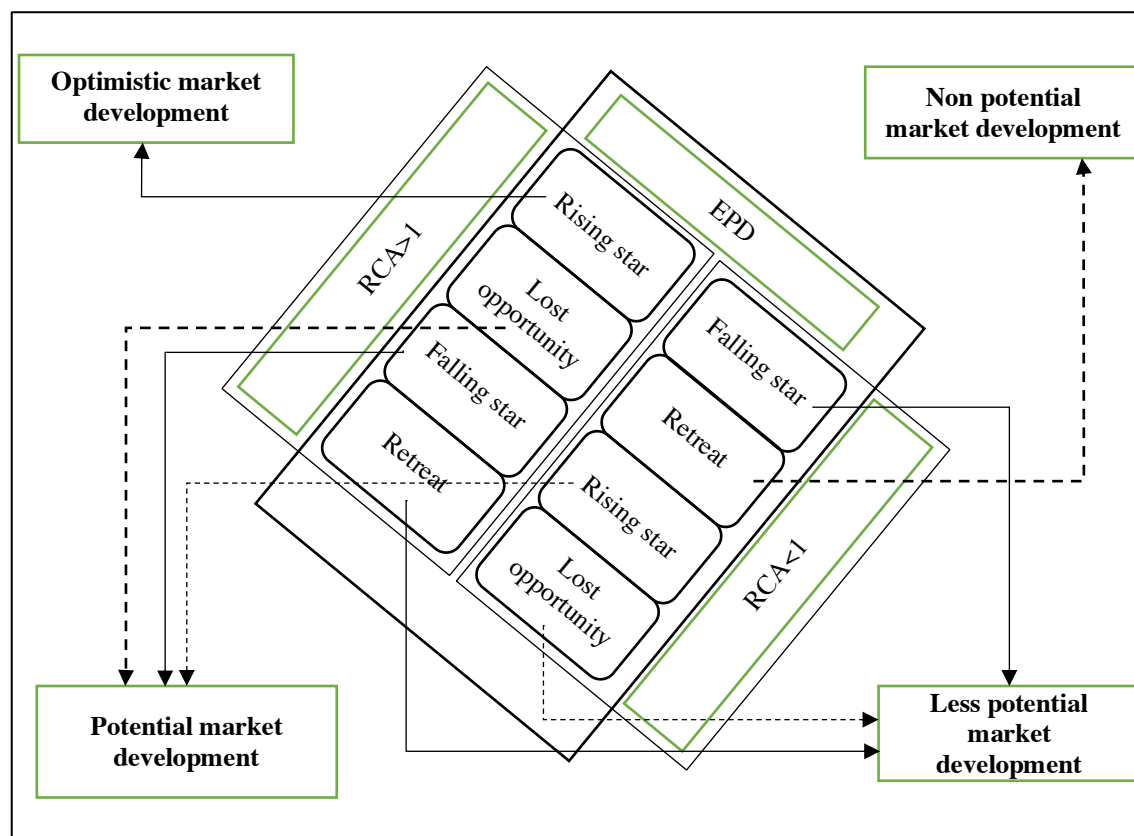

Figure 2. X-Model of potential export product.

3. Results and discussion

Seaweed is one of the primary commodities in fisheries sector in Indonesia. Indonesian seaweeds have a sufficiently good quality of carrageenan, agar and alginate. Generally, derivative products of seaweeds are used in food industry, feed, fertilizer, pharmaceutical, and cosmetics [7]. Seaweed quality is influenced by geographical position which impact to condition of climate, current, water quality and salinity. Indonesia has been developed seaweed industry centres in Sulawesi, NTT, NTB and East Java. Types of seaweeds being developed including *Gracilaria, Gelidium, Eucheuma, Hypnea, Sargasum, and Tubrinaria*. In Indonesia, *Gracillaria sp.* and *Euchema sp*. are types of seaweeds with high economic values since those produce agar and carrageenan. The following Table 1 is the production of Indonesian seaweeds from 2015-2019.

Table 1. Total production, export weight and value of Indonesian seaweeds in 2015-2019.

	2015	2016	2017	2018	2019
Production (tonnes)	15,634,093.04	16,002,319.09	16,114,990.71	15,790,293.92	15,128,051.15
Export weight (tonnes)	213,753.92	191,037.17	197,100.84	218,988.43	212,628.13
Trade Values (US$ million)	412.81	326.24	416.53	591.35	658.10

Source: [3,4]

Based on data of UN Comtrade, Indonesia was seventh in terms of seaweeds export value following Spain, China, Germany, Rep. of Korea, France and Philippines with total value US$ 2,067 million from 2015 to 2019. Export share of Indonesian seaweeds in world market from 2015 to 2019 grew by 4.66%. In terms of export destination, China was the biggest market for Indonesian seaweeds for three HS codes (HS 121221, HS 121229 and HS 130239), whereas Japan was the biggest market for HS 130231 and HS 262190. In terms of export volume, Indonesian seaweeds hardly grew by 0.19% from 2015 to 2019. This slow growth is contributed by negative growth from export value HS 121229 (-17.14%); nevertheless, HS 130239 and HS 262190 had contributed 29.35 and 24.90 percent to growth of trade value of Indonesian seaweeds from 2015 to 2019, respectively.

In 2019, Indonesian seaweeds with HS 121221 was the highest export value with US$ 363 million, and HS 262190 was the lowest export value with almost US$ 1 million [4]. Similar results in terms of net weight where HS 121221 was exported to world market around 363 million kgs and HS 130231 was exported to world market around 1.4 million kgs [4]. Those indicate that value-added of Indonesian seaweeds are still low in global market. Seaweed industry in Indonesia especially in Sumenep area needs to improve infrastructure for international delivery and institutional handling of environmental impacts [2].

Table 2. RCA and EPD estimation of Indonesian seaweeds in global market.

Commodity code	Commodity	Indonesian seaweed comparative and competitive position in world market				
		X	Y	Criteria	RCA	*Market Development Strategy*
HS 121221	Seaweeds and other algae; fit for human consumption, fresh, chilled, frozen or dried, whether or not ground	0.4928	-0.0481	falling star	14.69	potential market development

Commodity code	Commodity	Indonesian seaweed comparative and competitive position in world market				
		X	Y	Criteria	RCA	*Market Development Strategy*
HS 121229	Seaweeds and other algae; not fit for human consumption, fresh, chilled, frozen or dried, whether or not ground	-2.6693	-0.0481	retreat	4.85	less potential market development
HS 130231	Mucilages and thickeners; agar-agar, whether or not modified, derived from vegetable products	*0.1160*	*-0.0481*	falling star	*1.18*	potential market development
HS 130239	Mucilages and thickeners; whether or not modified, derived from vegetable products, n.e.c. in item no. 1302.3	0.8480	-0.0481	retreat	2.40	less potential market development
HS 262190	Slag and ash n.e.c. in chapter 26; including seaweed ash (kelp) but excluding ash and residues from the incineration of municipal waste	0.0074	0.0646	rising star	0.02	potential market development

Source: [4]

In general, Indonesian seaweeds had potential and less potential market development in global market as depicted in Table 2. Based on the estimation of EPD results, Indonesian seaweeds HS 262190 had the best benefit (rising star) in global market. However, Indonesian seaweeds HS 121221 and HS 130231 acquired falling star market shares, which shows that both seaweed products were unable to meet the growing demand in global market. In addition, HS 121229 and HS 130239 experienced retreat market shares. This may be caused by declining of RCA value of these products from 2015 to 2019. Falling star and retreat positions were not expected because these indicate Indonesian seaweed products had been weakened due to non-dynamic and non-competitiveness movements in world market [8].

These are the products in which Indonesia should be specialized in improving quality and productivity and continue producing. Export commodities that have been enjoying comparative advantages over 5 years and commodities that either are losing or improving their comparative advantages over the period are also shown in Figure 3-7. Overall, it turned out that Indonesia enjoyed comparative advantages from some destination. As expected, Indonesia enjoys its comparative advantages mostly from China and Spain, followed by China Hong Kong SAR and Philippines.

Results of RCA estimation for Indonesian seaweeds HS 121221 between 2016-2019 as seen in Figure 3 shows that destination countries with strong competitiveness (RCA > 1) were Canada, Chile, China, China Hong Kong SAR, Denmark, France, India, Philippines, Rep. of Korea, Spain Tunisia United Kingdom, USA and Viet Nam. Nevertheless, destination countries of Indonesian seaweeds HS 121221 with weak competitiveness (RCA < 1) were Japan, Malaysia, Other Asia nes, Singapore and Thailand. These results indicate that market share of Indonesian seaweeds HS 121221 was mostly strong in some

destination countries in global market. The RCA index ranges from zero to 1 if a country is categorized as not specialized in a given sector, and ranges from 1 to infinity if a country is specialized.

Using EPD method, Indonesian seaweeds HS 121221 had no optimistic market destination, whereas some destination countries were potential and less potential market development (Figure 3). However, Japan was the only destination country with status of non-potential market development for this product. Figure 3 also shows that Canada, Chile, China, China Hong Kong SAR, France, Philippines, UK, USA and Vietnam indicated a positive and potential market development. All these destination countries had a potential to develop Indonesian seaweed product market. On the other hand, some countries such as Denmark, India, Malaysia, Other Asia nes, Rep of Korea, Singapore, Spain, Thailand and Tunisia had less potential market. This may because growth of this product in Indonesia was negative compared to global growth.
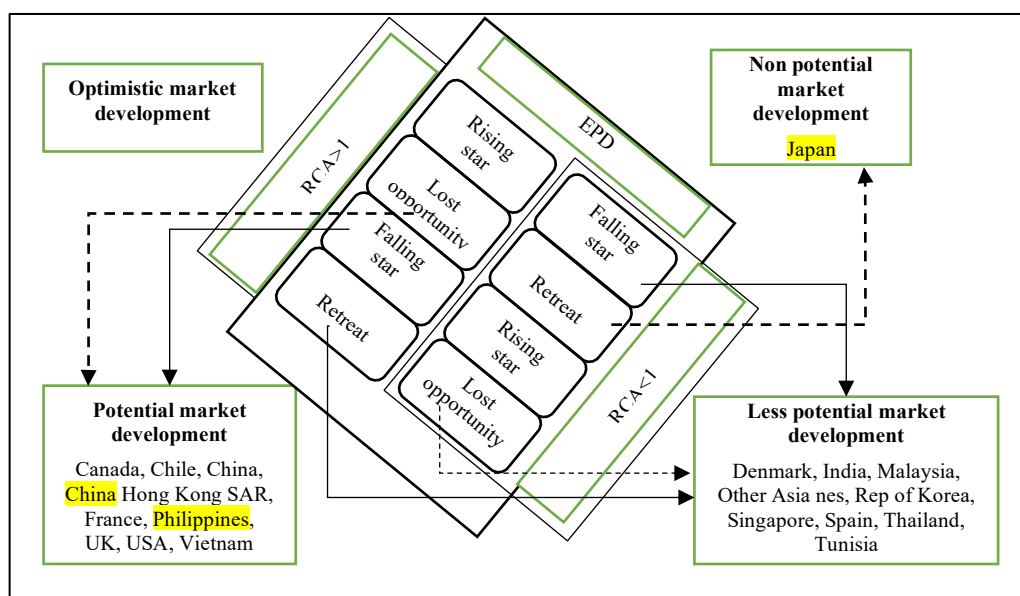

Figure 3. X-model for the market development strategy of destination countries of Indonesian seaweeds HS 121221 between 2016-2019.

RCA estimation results in Figure 4 portrays that Indonesian seaweeds HS 121229 between 2016-2019 had strong competitiveness (RCA > 1) in every destination country. These results indicate that market share of Indonesian seaweeds HS 121229 was mostly strong in in global market. The market position of Indonesian seaweeds HS 121229 in global market using EPD method can be seen in Figure 4. It can be seen that Indonesian seaweeds HS 121229 had no optimistic market destination and non-potential market destination, whereas some destination countries were potential and less potential market development.
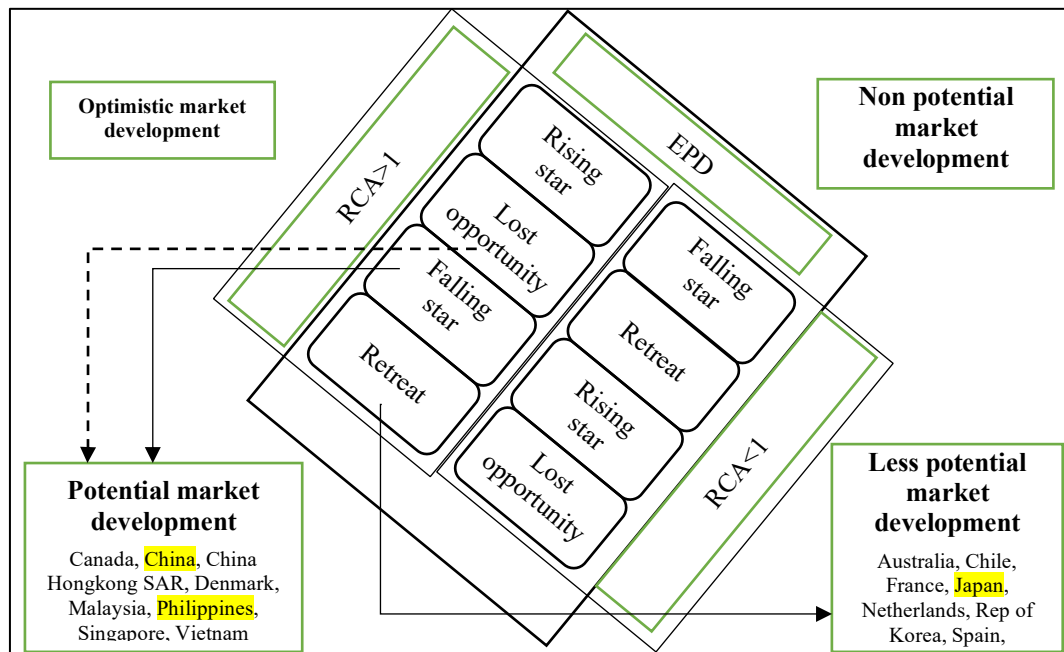
Figure 4. X-model for the market development strategy of destination countries of Indonesian seaweeds HS 121229 between 2016-2019.

RCA estimation results in Figure 5 shows that destination countries of Indonesian seaweeds HS 130231 with weak competitiveness (RCA < 1) between 2016-2019 were Canada, New Zealand, Rep. of Korea, Thailand and USA. These results indicate that market share of Indonesian seaweeds was mostly strong in some destination countries in global market. The market position of Indonesian seaweeds HS 130231 in global market using EPD method can be seen in Figure 5. It can be seen that Indonesian seaweeds HS 130231 were optimistic market development in China, Malaysia, Other Asia nes, Timor Leste and Uruguay, whereas New Zealand and USA were non-potential market destination.
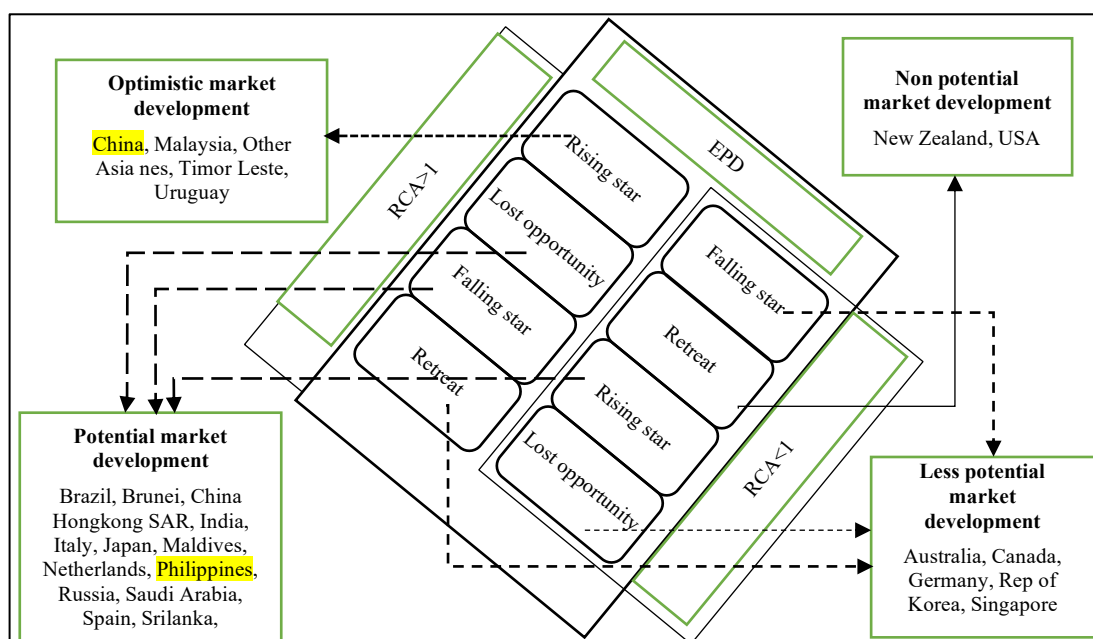

Figure 5. X-model for the market development strategy of destination countries of Indonesian seaweeds HS 130231 between 2016-2019.

RCA estimation results in Figure 6 shows that destination countries of Indonesian seaweeds HS 130239 with weak competitiveness (RCA < 1) between 2016-2019 were China Hong Kong SAR, Egypt, India, Japan, Other Asia nes, Pakistan, Philippines, Rep. of Korea, Singapore and Thailand. The market position of Indonesian seaweeds HS 130239 in global market using EPD method can be seen in Figure 6. It can be seen that Indonesian seaweeds HS 130239 had no non-optimistic market destination, whereas some destination countries were optimistic, potential and less potential market development.
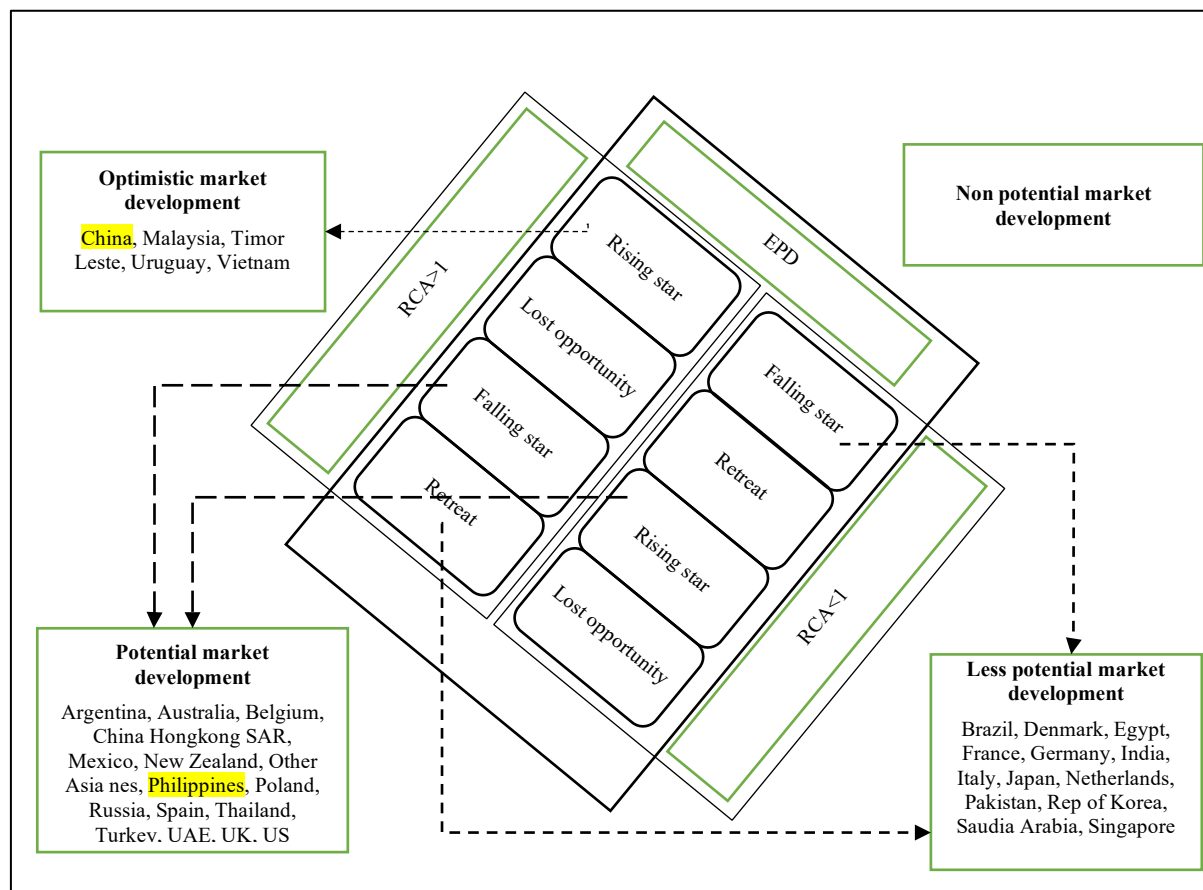

Figure 6. X-model for the market development strategy of destination countries of Indonesian seaweeds HS 130239 between 2016-2019.

Figure 7 shows that destination countries of Indonesian seaweeds HS 262190 were few. Market destination for HS 262190 were only Japan, Other Asia ne,s Rep. of Korea and Singapore. The market position of Indonesian seaweeds HS 262190 in global market using EPD method were potential and less potential market development to those destination countries. It can be assumed that Indonesian seaweeds were lack on product diversification.
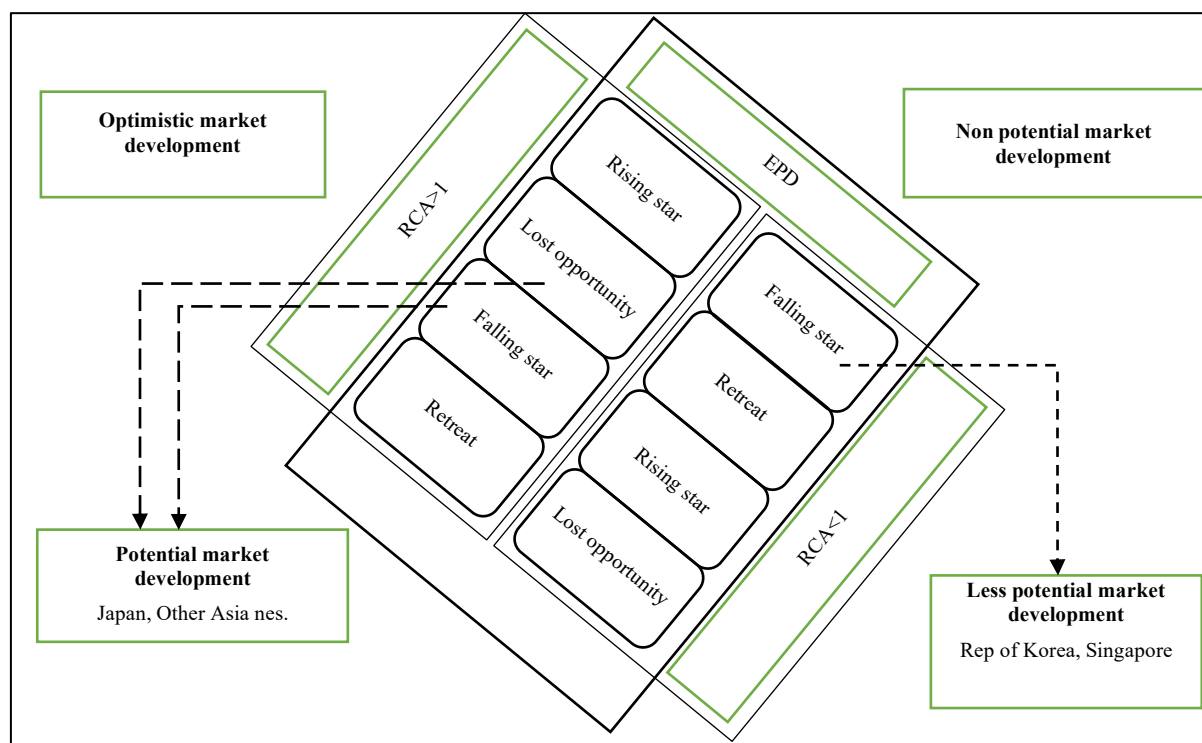
Figure 7. X-model for the market development strategy of destination countries of Indonesian seaweeds HS 262190 between 2016-2019.

Export market of Indonesian seaweeds need to develop by strengthening collaboration with some countries that have a potential market on seaweed products. The RCA index and EPD matrix show that Japan, Rep. of Korea and Singapore were destination countries of all Indonesian seaweed products on this study. Japan was a potential market destination for HS 130231 and HS 262190 and Singapore was a potential market destination for HS 121229. Rep of Korea and Singapore were less potential market destinations for those three seaweed products and other two seaweed products (HS 121221 and HS 130239). In addition, Japan was a non-potential market destination for HS 121221. However, China should not be driven away on market development for Indonesian seaweed export destination. Even though growth of trade volume of Indonesian seaweeds to China were only 2.15%, China was the primary market with average contribution by 37.8% of total export of Indonesian seaweeds during 2015-2019. In addition, China was an optimistic market destination for HS 121221 and HS 130231 and a potential market destination for HS 121229 and HS 130239.

In addition, Indonesia has not been developing market to Africa. There are few countries that have been destination for Indonesian seaweeds. For example, Egypt was a destination country for HS 130239 with position less market development due to low benefit (falling star). In addition, Tunisia was a destination country for HS 121221 and HS 121229, and the position was less market development as well.

4. Conclusion

The aim of this paper was to study the comparative advantage, competitiveness position and market development strategy of Indonesian seaweeds in export destination countries. from 2015 to 2019, total export of Indonesian seaweeds valued more than US$2 billion with average value US$ 413 million annually. In addition, average growth of Indonesian seaweeds was 4.66% during these periods. China was the biggest market destination followed by Rep of Korea and USA. Growth of export volume was low due to negative growth of HS 121229 in global market.

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It can be concluded that value-added of Indonesian seaweeds are still low in global market. HS 121221 was the highest export value with US$ 424 million, and HS 262190 was the lowest export value with almost US$ 1 million. HS 121221 is Seaweeds and other algae; fit for human consumption, fresh, chilled, frozen or dried, whether or not ground. Therefore, Indonesia should improve infrastructure for international delivery and institutional handling of environmental impacts. In general, Indonesian seaweeds had potential and less potential market development in global market.

Furthermore, it can be concluded that market share of Indonesian seaweeds HS 121221 was mostly strong in some destination countries in global market. Some destination countries for Indonesian seaweeds had strong competitiveness (RCA > 1) including Canada, Chile, China, China Hong Kong SAR, Denmark, France, India, Philippines, Rep. of Korea, Spain Tunisia United Kingdom, USA and Viet Nam. Nevertheless, few destination countries had weak competitiveness (RCA < 1) including Japan, Malaysia, Other Asia nes, Singapore and Thailand.

In general, Indonesian seaweeds had benefits from some destination countries. Indonesian seaweeds HS 262190 had the best benefit (rising star) in global market. However, Indonesian seaweeds HS 121221 and HS 130231 acquired falling star market shares, which shows that both seaweed products were unable to meet the growing demand in global market. In addition, HS 121229 and HS 130239 experienced retreat market shares. Some destination countries were potential to be developed and some were optimistic. However, some countries were less and non-potential to be developed. Japan was the only destination country with status of non-potential market development for HS 121221, whereas New Zealand and USA were destination countries with status of non-potential market development for HS 13023.

To conclude, Indonesia needs to strengthen collaboration with some countries that have a potential market on seaweed products. China, Japan, Rep of Korea and Singapore are countries that need to be paid attention for Indonesian seaweed export. Furthermore, Indonesia need to study for expanding market destination to some African countries since Indonesia had only few market destination in Indonesia.

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