The competitiveness of Indonesia's pepper export and its challenges

D H Azahari*, H J Purba, Erwidodo, V Darwis, F B M Dabukke, J Hestina† and E S Yusuf
Indonesian Center of Agriculture Social Economy and Policy Studies, Jln. Tentara Pelajar 3B, Bogor, West Java, Indonesia

*Email: delimahasridarmawan@yahoo.com

Abstract. Indonesia is the second-largest pepper (Piper Nigrum L) producing country after Vietnam and followed by India, Brazil, and Malaysia. While Vietnam is the largest black pepper producer, Indonesia is recognized as the largest white pepper-producing country. With the increasing market competition among them in the international market, Indonesia has to increase the market competitiveness of its pepper exports against its competitors. This study aims to analyze the competitiveness of Indonesian pepper exports in the international market by using secondary data from various sources, including from the Indonesian Ministry of Agriculture and the International Pepper Community for the year 2018. It focuses on Pepper beans (HS 0900411) and Pepper Powder (HS090412) and uses two methods, namely Revealed Comparative Advantage (RCA) and Export Products Dynamic (EPD). The RCA analysis shows that Indonesia has a comparative advantage as a pepper exporter on the international market, both for pepper beans and powder. However, the results of the EPD analysis revealed that such an advantage is declining. For example, the study revealed that the export of pepper beans from Indonesia to the United States is in the lost opportunity position, and to Vietnam and Singapore are in the falling star position. A similar situation occurs for pepper powder where Indonesia's export to Japan, Netherlands, and Germany are all in the falling star position. Such situations are caused by some challenges Indonesian pepper exports face, including the fulfillment of the good agriculture practices (GAP) in the upstream sector and compliance to international standards.

1. Introduction
Indonesia is the second-largest pepper (Piper Nigrum L) producing country after Vietnam and followed by India, Brazil, and Malaysia. While Vietnam is the largest black pepper-producing country, Indonesia is recognized as the largest white pepper-producing country. Even though Indonesia possesses the largest pepper planted area in the world, Indonesia is the second-largest pepper producer because of the low productivity level of only 0.76 tons/ha compared to Vietnam with productivity of 2.61 tons/ha. Productivity of pepper in Indonesia, however, is slightly higher than India of 0.46 ton/ha. The potential productivity of pepper can be reached until 3.0 tons/ha [1]. Some factors affect the low productivity of Indonesia's pepper, such as: domination of old-age plants, low use of fertilizers and pesticides, use of uncertificated and low quality seeds, and no use of plant support [2,3].

Studies showed that Indonesia's pepper has strong competitiveness in the global market, and Indonesia has the advantage for being a pepper exporter country [4,5]. Revealed that Indonesian pepper commodity exports had comparative advantages in the ASEAN market during the period of 2010-2016 [6,7]. The study showed that Indonesia has an RCA value of 33.90, which is higher than Vietnam's RCA
value of 7.91. Some studies also revealed that pepper is still relatively profitable for all players along the Indonesia value chain [8,9]. To improve the competitiveness of peppers exports can be attained by the shortening and or efficiency of the players along the value chain of pepper. For almost the decade, Indonesia's pepper export contributed to export earnings of US$ 298 million per year with growth of 2.69 % per year in value, but negative growth of -1.58 % per year in term of volume [2].

Indonesia's pepper production and industries are primarily located in Lampung, Bangka, Kalimantan, and Sulawesi. The Province of Lampung is the main center for black pepper production in Indonesia, known as Lampung Black Pepper, while the Province of Bangka Belitung is the center of production for white pepper or known as Muntok White Pepper. Indonesia's pepper are mostly produced by smallholders with several challenges, including small scale landholdings, limited access on financial support, and poor technology development especially on post-harvest and processing technology.

Considering the above situation, it is important to know and to understand how is competitiveness of Indonesia's pepper export in its destination countries and what are the challenges been faced in order to set a proper trade policy. This study aims to analyze the recent performance and competitiveness of Indonesia's pepper exports in the international market, identify the challenge, and recommend a policy recommendation.

2. Materials and methods

2.1. Materials
The data used is secondary data, time-series from 2009-2018 period. Data sourced from the Trade Map developed by the International Trade Center [10], the International Pepper Community [11], Indonesian Ministry of Agriculture and interviews with relevant stakeholders. The respondents selected for each province are: relevant agencies, exporters, large/small traders, processing industries, retailers, and producers/farmers (groups). It focuses on pepper beans (HS 0900411) and ground pepper (HS 090412).

2.2. Methods
This study aims to analyze the competitiveness of Indonesian pepper using Revealed Comparative Advantage (RCA) method [12] or Balassa Index as presented in [9,13]. The RCA value is based on equation 1 as follows.

$$RCA_{ij} = \frac{x_{ij}}{\sum_j x_{ij}} / \frac{x_{wj}}{\sum_j x_{wj}}$$

where:
- $RCA_{ij}$ : Level of Competitiveness of pepper products from Indonesia to country i
- $X_{ij}$ : Value of export of pepper product from Indonesia to country i (US$)
- $X_{wj}$ : Total export value of all commodities from Indonesia to country i (US$)
- $\sum_j X_{ij}$ : Total Export value of pepper products from the world to country i (US$)
- $\sum_j X_{wj}$ : Total export value of all commodities from all countries/world to country i (US$)
- $j$ : Commodity
- $i$ : Country i

If the value of RCA > 1, it means that the country has its comparative advantage because its share of commodity j in total export of country i is higher than the export of commodity j in export to the world. This indicates that the country is specialized in this commodity. Meanwhile, the value of RCA < 1 indicates that country i does not have its competitiveness in commodity j.

Together with RCA analysis, it continues using Export Dynamic Product (EPD) method as another indicator of country's competitiveness based on country's export position in his export destination country [14]. The EPD method consists of a matrix that puts the commodity in four categories, as shown in Table 1.
Table 1. Matrix of competitiveness position using EPD method.

| Share of country's export in world trade | Share of product in world trade |
|-----------------------------------------|--------------------------------|
| Rising (competitive)                    | Rising star                    |
| Falling (non-competitive)               | Falling star                    |

Position in the quadrant representing business ability (axis X) and market interest (axis Y) of the product. Business ability is measured based on the share of market growth of export destination while market interest measured based on the demand growth in export destination. The combination from market interest and business ability results in the character product position of each four quadrants (Figure 1) [2,15].

Figure 1. Products competitiveness position by EPD method

Mathematically, business ability/growth of export share (axis X) was formulated as follows:

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

while market interest of export product (axis Y) formulated as follows:

$$\sum_{t=1}^{T} \left( \frac{X_{j}}{X_{w}} \right) \times 100\% - \sum_{t=1}^{T-1} \left( \frac{X_{j}}{X_{w}} \right) \times 100\%$$

where:

- $X_{ij}$: Pepper export value of Indonesia to country i (US$)
- $X_{iw}$: Total Pepper export value of world to country i (US$)
- $X_{j}$: Total all commodities export value of Indonesia to country i (US$)
- $X_{w}$: Total all commodities export value of the world to country i (US$)
- $T$: Number of years
- $t$: year – t

The rising star position is the position desired in global trade, means that the percentage is facing growth rapidly. In contrast with the position of lost opportunity resulting from reducing the domestic market share when the export market still growing. The falling star position is the lost opportunity position, meaning the increasing the share of product export in the export market, however a lower position of products in the world trade and products market in export destination countries are no longer dynamic. Finally, the retreat position the commodity was stagnant and not competitive in the country's destination [13].
3. Results and discussion

3.1. The recent pepper export performance

There are at least 19 destination countries for Indonesian pepper export, namely United States, Australia, Netherlands, Belgium, Bulgaria, Hongkong, India, English, Italy, Japan, Germany, Canada, South Korea, Malaysia, Pakistan, France, Russia, Singapore, and Vietnam [16]. The study showed that Indonesian pepper had competitiveness in all those pepper export destination countries. It is also showed that Vietnam is the main competitor of Indonesia pepper beans export in the world, however, Indonesia pepper beans price in USA market more competitive compared to Vietnam.

The overall, Indonesia's pepper performance can be seen in Table 2. The planted area increased by 2.21% per year, but production and productivity growth in a downturn trends of -0.39% and -2.90% per year, respectively. Indonesia pepper export performance also faces big challenges as the growth of export volume per year is 11.86%, but the growth of value is -7.23% [17]. The total export value decreased from 323 million US $ in 2014 to 147 million US $ in 2019, while total export volume increased from 34.7 thousand tons in 2014 to 51.7 thousand tons.

Table 2. Indonesia's pepper performance, 2014-2019.

| Description            | Years   | Growth (%)/yr |
|------------------------|---------|---------------|
|                        | 2014    | 2015          | 2016    | 2017    | 2018    | 2019    |
| Acreage (ha)           | 162,751 | 167,590       | 181,390 | 186,297 | 187,003 | 180,926 |
| Production (ton)       | 87,448  | 81,501        | 86,334  | 87,991  | 88,235  | 85,323  |
| Productivity (kg/ha)   | 921     | 828           | 804     | 798     | 789     | 792     |
| Export volume (ton)    | 34,733  | 58,075        | 53,100  | 42,691  | 47,916  | 51,771  |
| Export Value (US$ 000) | 323,802 | 548,193       | 430,141 | 235,962 | 152,471 | 147,342 |
| Domestic prices         |         |               |         |         |         |         |
| White pepper (Rp/kg)   | 135,198 | 150,000       | 129,798 | 131,454 | 143,867 | na      |
| Black pepper (Rp/kg)   | 77,916  | 89,729        | 86,460  | 98,585  | 102,592 | na      |
| International prices   |         |               |         |         |         |         |
| White pepper (US$/ton) | 12,000  | 11,150        | 10,485  | 6,434   | 3,398   | 2,954   |
| Black pepper (US$/ton) | 8,500   | 7,183         | 6,309   | 4,093   | 2,952   | 2,476   |

Source; [11,17,18]

In terms of prices, the growth of price of both white and black pepper in domestic market tend to increase by 2.05% per year for white pepper and 7.40% per year for black pepper, respectively. In contrast, the growth of white and black pepper in world market tend to decrease by -22.39% per year for Indonesia, white pepper and -21.36% per year, respectively. The average pepper price in the world auction market of Vietnam, India, and USA (New York) tends to decrease [11]. Black pepper mostly trades in Vietnam and India, while white pepper mostly traded in New York auction. In 2014, the average price of black pepper in India's auction is 11,000 US$/MT while in Vietnam's auction the price are more cheaper of 6,000 US$/MT. In 2018, the average price decreased to 3,000 US$/MT (India) and 5,000 US$/MT (Vietnam). Similar situation also exist for white pepper where the price decreased from 3,000 US$/MT in 2014 to only 1,000 US$/MT in New York auction market. Indonesia's pepper beans price in USA market are more competitive compared to Vietnam.

3.2. The competitiveness of Indonesia's pepper

The RCA analysis revealed that both Indonesia's pepper beans and ground pepper export had a comparative advantages in almost all export destination countries. The RCA values of United States, Vietnam and Singapore were 34.86, 45.30, and 10.48 respectively for pepper beans and 4.74, 9.42, and
29.98, respectively for ground pepper in Japan, Netherlands Germany. The complete result of the analysis are shown in Figure 3 and Figure 4.

The research results revealed that Indonesia's pepper bean export comparatively superior in USA, Vietnam and Singapore, and Vietnam market is the most competitive in 2013 onward. While in USA market, the share of pepper bean export showed the superiority during 2009 to 2016, but started to declined in 2017. However, in 2018, RCA analysis showed Indonesia's pepper bean export showed at the position to re-born (Figure 3).

While for ground pepper export, Germany market showed that Indonesia's ground pepper is the most competitive during 2009 to 2017, but since 2017 the Netherlands market showed that the Netherlands market is growing stronger (Figure 4). The dynamic results of RCA analysis on Indonesia's pepper bean and ground pepper very important as a basis to continue with the analysis of EPD.

### Table 3. Value of (EPD) of Indonesia pepper beans in main country destinations, 2009-2018.

| Destination country | Average growth of share of pepper beans export (%/yr) | Average growth of share of total export (%/yr) | Position under EPD analysis |
|---------------------|------------------------------------------------------|-----------------------------------------------|-----------------------------|
| USA                 | -3.3125                                               | 0.0030                                        | Lost opportunity            |
| Vietnam             | 6.4125                                                | -0.0159                                       | Falling star                |
| Singapore           | 0.8544                                                | -0.0072                                       | Falling star                |

The study also reveals that in USA the position of Indonesia's pepper bean export is in the position of lost opportunity while in Vietnam and Singapore, export of pepper beans from Indonesia are in the position of "falling star", which means that the average growth share of pepper bean in USA are decreased while there are still growing demand of Indonesia's pepper beans in Vietnam and Singapore markets, however the share of total export from Indonesia is slowing down. Vietnam is the main competitor of Indonesia for pepper exports while Indonesia also exported the pepper beans to Vietnam market. This situation is driven by the big market demand in Vietnam market, together with the ability and better penetration of Vietnam exporter to the global market. This is a new finding compared to previous one, where previous study such as by [17] shows that using EPD analysis Indonesia's pepper have strong competitive advantages in all destination countries except in South Korea, Malaysia, and Pakistan. This EPD analysis confirmed that export of pepper bean from Indonesia to Vietnam and Singapore still promising and potentially developed.
Furthermore, the results of EPD analysis of Indonesia's ground pepper export competitiveness presented in Table 5. The results show that for ground pepper in all main destinations were in falling star position. This means Indonesia is gaining additional market share in ground pepper export with significant growth but the growth of total Indonesia's products exports are slowing down. The strategy that can be done is to maintain and increase market share in main export destination and actively seek new markets (market diversification).

| Destination countries | Average growth of share of ground pepper export (%/yr) | Average growth of share of total export (%/yr) | EPD analysis position |
|-----------------------|------------------------------------------------------|------------------------------------------------|----------------------|
| Japan                 | 0.5492                                               | -0.0850                                        | Falling star         |
| Netherlands           | 0.7398                                               | -0.0015                                        | Falling star         |
| Germany               | 0.0228                                               | -0.0044                                        | Falling star         |

Based on the results described above, Indonesia's pepper exports are in falling star position, so and still have an potential to become a leader as pepper exporter in main destination countries with mature and positive growth level such as Vietnam market for pepper bean and Japan and the Netherland Markets for ground pepper. Therefore, to increase the position of Indonesia's pepper exports, some strategies needed are firstly to improve price competitiveness (fob and cif price), secondly is to increase the productivity of the pepper harvest, thirdly is intensified the quality improvement and finally comply and implemented a traceability in order to comply with international standard [18].

3.3. Challenges in pepper export acceleration program

The dynamic results of Indonesia's pepper bean and ground pepper export using RCA and EPD analysis confirmed that Indonesia need to overcome with some challenges in order to maintain and increased its present position. As pepper is still cultivated traditionally and the average productivity is relatively is still low, the challenge faced by Indonesia's pepper export could be categorized as (i) on-farm such as plants condition which dominated by mature plants (>30-40 years), replanting program was slowed constraints by financial access faced by the farmer, and limited Good Agriculture Practices in cultivation; (ii) off-farm, especially traditional practices in harvesting and processing and limited food safety management and in domestic and international trade [2,19].

The pepper export acceleration program was set and implemented with comprehensive strategy through increasing productivity and production, improving quality, increasing value added and complying international standard [20]. To support the export acceleration program, Ministry of Trade also implemented some policies such as affixed signature and stamp for Certificate of Origin; authentication for export permit and reputable trader for easing import; training for candidate new exporter; Warehouse Receipt System; product certification; optimalization of bilateral and regional trade cooperation; and increasing market access through promotion and trade mission [21].

Indonesia needs to focus on downstream industry development. This require conducive investment climate in order to attract Foreign Direct Investment-FDI, and more flexible in Foreign Equity Participation-FEP). Meanwhile, the pepper downstream industry development still faces some challenges, among others: unstable continuity supply and quality of raw material; limited real time database of farmer, plantation, productivity for the need of sustainability and traceability; limited processing technology; very limited of SMEs which comply and implemented of food safety management (GMP/HACCP/ISO 22000/FSCC 2000); limited information available for SMEs related potential pepper export; the buyer demand heavily on pepper beans and one price policy; and unknowledgeable in export certification process.
4. Conclusions
The results of the competitiveness analysis show that Indonesian pepper exports have competitiveness in the international market. Indonesia's pepper, both for pepper beans and ground pepper, has strong comparative but less competitiveness advantage in almost all main pepper export destination countries. This study confirmed that Indonesia's pepper beans export to the United States is in the position of lost opportunity means the share of Indonesia's pepper export still growing while the total Indonesia export is slowing down. In Vietnam and Singapore, export of pepper beans from Indonesia is in the position of falling star. The same condition for ground pepper, in all main export destinations were in the falling star position. This means that the share of Indonesia's total pepper export was increasing even though the growth of total export is decreasing.

Responding to this situation, Indonesia needs to have integrated government policy support, including downstream and upstream industry development to increase Indonesia pepper's value-added, excavating export through economic cooperation, and promotion need to accelerate. There is also a need for more efforts to improve Indonesia's pepper competitiveness through the improvement of economic of scale and processing technology, particularly those that can increase productivity and comply to international standards. The strategy that can be carried out are through increasing production and improved the processing industry accompanied with quality improvement and efficiency of cost production. Government and all stakeholders can also accelerate and promote the uniqueness and the advantages of Indonesia's pepper both through diplomatic cooperation and accelerated commitment of bilateral, regional and multilateral.

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