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On the Priorities of Indonesia's Agricultural Trade: Which Product-Market Combinations Are Economically the Best?

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Abstract

This study aims to identify the best combination of product and market in the context of Indonesian agriculture using the newly developed measure of comparative advantage. The study focuses on a sample of Asian (Middle, East, and West) markets. Required data is collected from the Food and Agriculture Organization of the United Nations. This paper contributes to relevant Southeast Asian literature by applying a productivity-based comparative advantage index to determine the best product-market combination. Main findings reveal that in the Middle Asia market, palm oil is the only product of export priority. In the East Asia market, we found such advantages for coffee, tea, and spices. Moreover, in the West Asia market, Indonesia has an export advantage in palm oil, coconut, coffee, tea, and spices. Based on found priorities, considering export support policies in the identified markets as well as signing bilateral preferential trade agreements with trade partners is recommended.

Keywords: comparative advantage, exports, agricultural products, Indonesia.

1. Introduction

Trade acts as an accelerator to economic growth in both developing and developed countries. Economists have always recommended having trade relationships with other countries. They believe trade would bring many benefits, including foreign currency reserves, domestic industries input needs, job creation, technology transfer, and economic and political power. Boosting trade relations (bilateral and regional) has, as a result, historically been an integral part of economic development plans for nations seeking to sustain economic growth like Indonesia. Southeastern Asian countries are among fresh examples confirming the above claim (Suwarno et al., 2021).

The Ricardian model, as one of the well-known theories in international trade literature, suggests that countries should specialize in the production and export of products in which they perform more productively. Although this model is among the outstanding theories in international economics, it has not received the desired attention in empirical studies. This unpopularity is primarily due to the lack of sound foundations to assist researchers in practical applications.

Export stimulates parts of the economy directly and indirectly. On the one hand, it causes more demand for industries producing exporting commodities, and on the other hand, it leads to a greater sales market for suppliers of resources needed in their production. Moreover, all individuals and firms involved in the marketing chain (business) of the products (known as stakeholders) would face greater opportunities in their business. Agriculture plays a key role in economic development. It contributes to gross domestic product, provides employment opportunities mainly in rural areas, ensures food security, and assists governments in accumulating foreign currency reserves.

Agriculture promotes agro-industries through its backward and forward linkages. It is the main source of income for rural people, constituting 20–60 percent of the population in developing countries. Relying on natural resources, such as land and water, gives agriculture the vital responsibility of preserving these nature-given gifts. Therefore, meeting sustainable development goals (SDGs) requires special attention to farmers' well-being, as poor farm workers are likely to put extra pressure on land and water resources for their families to survive. Hence, export promotion policies are of great importance as they provide more earnings to the farming sector. Therefore, the identification of possible target markets for different agricultural products and their capacity to absorb the country's export products seems necessary (Hassan & Meyer, 2020).

Indonesia has a tropical climate (like other Southeast Asian countries) characterized by heavy rainfall, high humidity, and high temperatures. The average annual precipitation varies from 2500 mm in the lowland areas to more than 6000 mm in the mountain regions. The total area of agricultural land in Indonesia is 62.3 million ha, out of which 51.3 million ha is dedicated to the crops. Indonesia sold $19.2 billion in agricultural products to the world market in 2019 (Figure 1), while a similar value for agricultural imports was $32.9 billion, implying a $13.7 billion trade deficit. Therefore, an accurate examination of the real and potential markets for Indonesian agricultural exports based on common economic measures seems necessary (Ghotekar et al., 2020). Furthermore, the value of the main agricultural exporting products (palm oil and green coffee) is presented in Figure 2. The major destination markets for Indonesia's agricultural exports are West Asia, the Middle East, and some European nations.

Figure 1. Evolution of Indonesia's agricultural exports (million USD).

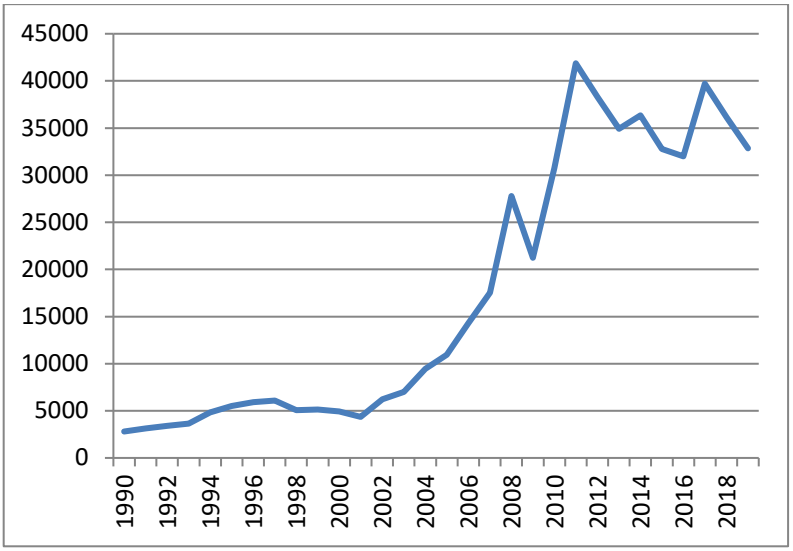
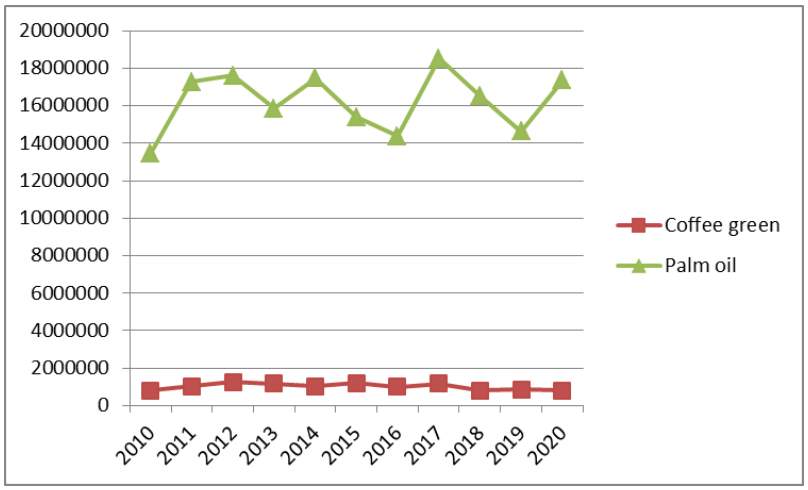


Figure 2. Value of major Indonesian agricultural products (000USD).



Considering the accelerated role of exports in economic growth, all countries try to penetrate into the world market and make a sustainable market share for themselves. To accomplish this, it is of high importance to study different possible markets, their demand situation, and countries currently present in the markets (competitors). Here, relying on relevant economic

measures such as comparative advantage plays a key role (Vo & Ngo, 2021).

Successful experiences of the countries in the region, known as the newly industrialized countries (NICs), which includes Thailand and Malaysia, regarding export promotion policies could be helpful. The Indonesian authorities should review the causes of the relatively rapid economic development of these nations with special emphasis on the role of exports. They must discriminate, however, between the export of raw and processed products, as the former actually implies the export of jobs and income, while the latter means saving employment and income in the home.

Official statistics show that in Indonesia, agriculture provides 38.22 million job opportunities and contributes to 13.8 percent of the national GDP. Paddy (55 million tonnes) and palm oil (48.3 million tonnes) are two major Indonesian agricultural products. In this regard, Indonesia's agricultural needs are twofold. First, agricultural production should increase through the dissemination of new technologies and improving productivity. Second, export promotion policies must be followed both in terms of quantity and target market diversification. Reaching such desired goals primarily requires proper studies. The present research is an empirical attempt to determine the economically reasonable product-market combinations in the context of Indonesian agriculture. It shows which Asian market is suitable for the country's agricultural products export based on the comparative advantage concept. Presented below are some relevant works found in the literature.

Ishchukova and Smutka (2013) examined agricultural export performance in the Russian Federation from 1998 to 2010. They applied the common index of Balassa for two sub-periods. From 1998 to 2001, they found evidence of comparative advantage in three products, i.e., wheat, sunflower, and bran, while

from 2001 to 2010, they concluded that Russia had an advantage in the export of four items, i.e., fresh milk, sunflower, barley, and wheat. Using four decades of time series data, Riaz and Jansen (2012) applied different measures in looking for any possible advantage in the context of Pakistan's agricultural exports. Their main findings revealed a great advantage in the export of rice and some permanent crops, while no evidence was found in favor of livestock products. The authors recommended that Pakistani officials have diversification of export markets, as there are noticeable potentials in some undiscovered markets.

In research conducted by the Department of Agriculture, Forestry, and Fisheries (2011), the competitiveness of selected South African agricultural products in EU-27 markets between 2001 and 2009 was examined. Two common indices, i.e., Revealed Comparative Advantage (RCA) and Comparative Export Performance (CEP), were computed using data provided by the International Trade Center (ITC). Results confirmed that fish, vegetables, fruits, and beverages originating from South Africa could nicely challenge the same products imported from other countries. Moreover, the study showed that South Africa could not compete in terms of cereals, tobacco, and sugar in the above-mentioned market.

Serin and Civan (2008) quantified Turkey's agricultural comparative advantage in the European Union market. They focused on olive oil, fruit juice, and tomato as three main agro-industries. Two RCA and CEP were calculated and analyzed from 1995 to 2005. An import demand function was also estimated for the EU's imports from Turkey's competitors. Results from both computed indices and estimated regression showed a significant advantage in terms of olive oil and fruit juice, but the same conclusion was not found in the case of tomato.

Bender and Li (2002) investigated the performance of exports from the manufacturing sector in a group of Asian and Latin American territories from

1981 to 1997. Their work was established on Balassa's theory of comparative advantage. They believed that a change in trade policies could lead to a change in a country's trade performance. Empirical findings strongly revealed that comparative advantage is smoothly shifting from East Asian nations to less-developed economies in Latin America and Southeast Asia.

Helleiner (1990) argued that trade strategy is a key factor in the controversy over stabilization and adjustment. Trade performance is an indicator of trade strategy orientation. He states that experiences recorded by developing economies show that trade strategies are more diverse than can be simply categorized as inward or outward orientation. As a result, there are many unsettled trade policies that need to be addressed on a country or industry-specific basis.

Almost all economists with different economic backgrounds have reported the determinant role of trade in countries' growth and development. The bulk of empirical works relying on historical data from developed nations have emphasized the above-mentioned belief. The creation of the General Agreement on Tariff and Trade (GATT) in the 1940s and its eight follow-up trade negotiation rounds leading to the establishment of the World Trade Organization (WTO) in 1995 is another witness to the accelerator function of trade (in both goods and services) in economic promotion.

Foreign trade brings short- and long-run benefits for countries engaged, though larger economies are expected to gain more than small countries (Vo & Ngo, 2021). In other words, there is a direct association between the size of the economy and trade gain. In addition, countries with a greater share in the world trade of a given commodity have the ability to influence world prices and dominate the market. Export (foreign demand) adds to the domestic demand,

leading to a price jump (holding supply constant). This, in turn, creates employment and income for all industries involved in the marketing chain of the commodity, and those firms provide intermediate inputs required in the commodity's production process as well. However, governments may meet the domestic demand for final goods and inputs that are not locally produced through import. Moreover, import facilitates technology transfer, which is of high importance for developing nations.

Apart from the above advantages, trade brings some problems, especially in terms of high pressure on the basic resources of society. Excess demand for agricultural products forces farmers to either expand acreage or increase production per hectare (yield) by the intensive application of chemicals (fertilizer and pesticides). The former implies more extraction from underground water reserves, while the latter means polluting soil and water, which, in turn, endangers human health. These adverse environmental effects of trade have caused growing concerns during the last three decades and are the main reason behind the demonstrations during the biannual WTO ministerial meetings since its foundation. The environmentalists strongly believe that trade under current international rules has devastating impacts on nature. They demand modification in the trade regulations in order to respect the environment and preserve the definite right of future generations to use natural resources.

Accordingly, trade promotion policies should integrate into the environmental protection measures to ensure the least harm to nature. In a more technical statement, the policymakers must keep in mind that the implementation of plans seeking maximum private profit in the past is the main driver of the environmental degradation we are facing today (Anooshehpour et al., 2021). Government officials in charge of production decisions are urged not to rely on

a single goal (maximum profit) policy objective function and consider its multi-goal alternative (environmental protection, maximum profit) instead.

Comparative advantage is the other crucial issue that should be addressed in both production decision and trade. This vital economic concept compares the cost of production valued at social prices for different commodities. Its focal point is on the number of domestic resources applied to each unit of production. If product A were produced at a relatively lower cost than product B, the former would have a comparative advantage over the latter. Production decisions based on comparative advantage ensure the prevention of unnecessary (extra) pressure on resources. Nations with limited basic agricultural resources (land and labor) need to allocate scarce resources among alternative enterprises according to the principle of comparative advantage.

When countries expand their production, with a look at the social cost of production, and decide to trade with each other, both have the possibility to gain more than in the case of no trade. Comparative advantage suggests specialization in the export of a group of commodities, even if the given country produces all products at a lower cost than other nations (holds absolute advantage).

Identification of potential target markets is a key factor in the expansion of exports. An exporting country needs to recognize its competitors in all target markets for any given export product. This helps them to outperform through appropriate policies. In economic and marketing literature, this feature is known as competitive advantage. It is a characteristic that enables a country to perform better than its rivals (Roosta et al., 2017). It points out higher satisfaction for the consumer resulting from lower prices or by providing more advantages that justify higher market values. Exclusive access to production factors (e.g., natural resources), a professional (highly skilled) labor force, location in a unique

geographical area, and the ability to produce a commodity at lower expense are the main creators of competitive advantage.

Establishment of competitive advantage requires the three following conditions to be met: first, recognition of all benefits (interests) the product provides; second, to identify markets that are either currently the country's trade partner or imported from competitors or could be regarded as potential target markets; third, competitors should be understood, and their performance and policies need to be examined carefully as well (Anooshehpour et al., 2021).

Countries aiming at export promotion may adopt two strategies: (1) cost leadership and (2) differentiation. The first suggests focusing on production costs. Here, the main goal is to produce at the lowest cost, which may be achieved through large-scale production using superior technology or the application of methods that intensively use the abundant factor of production. The second strategy is established on the idea that obtaining market share needs unique positioning. This concentrates on adding value for consumers through the provision of benefits. A country seeking construction of its export promotion policy on differentiation requires continuous investment in product quality, branding, broad distribution channels, and marketing capabilities (e.g., advertisement) (Porter, 1998).

Market research is the most vital step to a country's international trade success after an export promotion plan. As there are nearly 200 countries and territories in the world, it is necessary for a country to decide on the right products or services to target. To accomplish this, market research is the key instrument. The viability of an export promotion strategy could be determined by the selection of the right target markets and learning how to connect to them. The following are the main strategies for selecting target markets:

a. Market concentration: This strategy suggests focusing on a few selected markets to ensure continuous sales and holding the fixed market share. This helps to obtain detailed knowledge of markets, reduce logistics costs, and allocate more resources to market promotion.

b. Market diversification: This suggests introducing the product to as many marketplaces as possible, even with limited shares. Countries following the market diversification strategy have the potential for quick sale growth and charging different prices in different markets for the same product as well. Moreover, it spreads the risk of business across more markets.

After the selection of candidate countries as potential target markets, it is generally recommended to analyze each one based on the following variables:

- Country's economic prospect: Refers to the projected economic growth trend of the country and predicted demand for foreign products.
- Overall risk evaluation: Includes political, social, and economic instability.
- Political factors: Refers to the degree of independence of trade decisions from governmental interventions and possible bilateral trade agreements between the country of origin and the target country.
- Other variables: Include social, cultural, and geographical similarities between nations.

By applying the above-mentioned criteria along with the potential demand for the product, taxes, administrative costs, and rules in the target markets, those countries would be prioritized. After selecting the markets, one needs to identify the main competitors in each target market and analyze their sales performance during at least the last three years. Moreover, specific factors of competitors, namely prices, plans, and market development strategies, and financial situation,

should be detected.

To summarize, the previous studies have applied traditional comparative advantage indexes to investigate agricultural export advantages, while we adopted newer criteria that incorporate productivity measures. By doing this, those findings obtained based on older indexes could be complemented, and, therefore, we could provide more accurate conclusions.

2. Materials and methods

2.1 The statistical model

We established our statistical model based on the theoretical justifications provided by Costinot et al. (2012). They distinguish between two groups of factors creating trade disruption. The first group includes bilateral (regional) variables, e.g., trade impediments (tariff and non-tariff barriers), geographical distance, common language, common border, colonial ties, and cultural similarities. The second group primarily constitutes unexpected variations in each of the trade partners' economic conditions. For instance, political disorders and instabilities and long-run demand changes due to changes in consumer taste in a country might result in trade disruption. By application of a new measure of comparative advantage and estimation of an econometric model, we are able to capture the impacts of two groups of factors. In other words, the theoretical basis provided by Costinot et al. (2012) is inspired by the Ricardian model with a single factor of production (such as labor) and k industries, which are supposed to operate in a perfectly competitive market. If we denote the measure of productivity of industry *k* in the country *i* by Z_{ik}, one can specify the trade flow between countries as the following equation (Eaton & Kortum, 2002):

$$Ln\left(X_{ijk}\right) = \sigma_{ij} + \sigma_{jk} + \theta Ln\left(Z_{ik}\right) + \varepsilon_{ijk} \quad (1)$$

where *i*, *j*, and *k* stand for exporter, importer, and industry, respectively. The parameter σ_{ij} represents the fixed features of two trade partners, σ_{jk} captures the characteristics of the industry *k* in the importing country *j*, and Z_{ik} takes the above-mentioned definition, which is equivalent to the technical parameter in the Ricardian model. The key assumption in equation (1) is that the technological disparities between the trade partner countries depend on two critical parameters, namely the productivity level in the exporter country (Z_{ik}) and a measure of productivity distribution among different industries in the exporter country (θ), which is postulated to be constant for a country at any point in time.

The parameter (θ) indicates the lack of uniformity in terms of productivity among industries. In addition, Z_{ik} plays a key role in the estimation of the Ricardian comparative advantage index, which encompasses all influential factors on productivity, including climatic variables (especially for agricultural activities), infrastructure, institutional arrangements, and policy programs. In other words, due to appropriate climatic conditions owing to the specific geographical location, a given country might produce a specific agricultural product at a lower cost than its competitors do. In this case, one might claim that country has an advantage in the production of that product. Indeed, the productivity in the production process of the product is higher than that of other producing countries. All these features, taken together, show the ability of the Ricardian model to explain trade flows among nations and industries.

Considering the constant features of the exporter country, one may say that equation (1) is a specific specification of equation (2):

$$L\,n\left(X_{ijk}\right) = \sigma_{ij} + \sigma_{jk} + \sigma_{ik} + \varepsilon_{ijk} \qquad (2)$$

The above equation specifies the exports of product k from country i to the destination country j as a function of three different effects. The parameters σ_{ij} , σ_{jk}, and σ_{ik} denote the exporter-importer, importer-industry, and exporter-industry fixed effects, respectively. The OLS estimation of equation (1) provides a prediction of technological disparity (θ) through the fixed characteristics of the exporter country, σ_{ik}, though use of the instrumental variable (IV) estimation technique is preferable in order to derive unbiased estimates. For the simplicity of estimation, we use the proposed value from Costinot et al. (2012) for (θ) at 6.53. This estimate is comfortably consistent with similar figures represented in previous works. Therefore, we can calculate Z_{ik} according to the following equation:

$$Z_{ik} = e^{\frac{\sigma_{ik}}{\theta}} \tag{3}$$

An interesting point of equation (3) in calculating productivity relates to its data requirement. Application of the above equation gives a reliable estimate of productivity in country i and industry k with no need for information regarding trade expenses, production factor endowment, or payments to factors (like wages). It is a great advantage since access to such data might be limited, especially in developing countries. Moreover, it is worth mentioning that the simple method of calculating productivity measure rendered by equation (3) provides an alternative to Balassa's widely used index of revealed comparative advantage (RCA), which is theoretically consistent. Both methods rely on exports shares (in country i and the world) to compute a measure of comparative advantage.

Apart from this similarity, there are some differences between the two approaches. The most important one is that, unlike Balassa (1965), by application

of the simple method in equations (1) to (3), there would be no need to aggregate trade data across industries and countries, which lets researchers distinguish between the influence of demand differences, trade expenses, and productivity disparities on the trade flow.

Equation (4) gives the formula for computing revealed comparative advantage applied in the present study:

$$RCA_{ik} = \left(\frac{Z_{ik}}{Z_i}\right)\left(\frac{Z}{Z_k}\right) \quad (4)$$

where Z is the simple average of Z_{ik} for all countries and industries, Z_i stands for mean productivity for all industries in country *i*, and Z_k represents the average productivity for all countries exporting product *k*. If RCA_{ik} is greater (lower) than 1, country *i* would have (would not have) comparative advantage in export of product *k*. Finally, $RCA_{ik} = 1$ implies that no judgment could be made on comparative advantage for industry *k* and country *i*.

Comparing traditional and newly developed indexes provides a more accurate claim, while what we calculated revealed symmetric comparative advantage (RSCA) along with the above-mentioned index. The RSCA is computed as Equation (5) (Laursen, 1988):

$$RSCA_{ik} = {(RCA_{ik} - 1)}\Big/{(RCA_{ik} + 1)} \quad (5)$$

RSCA varies between -1 and 1. A positive value indicates the existence of comparative advantage, while a negative value implies the lack of comparative advantage.

2.2 Data

Required information, including the agricultural exports value from Indonesia to its target markets, the status of Indonesia's competitors in the same

markets, and the producer price (in which we applied its inverse as a proxy for productivity) is extracted from the Food and Agriculture Organization of the United Nations (FAO) databases for the period 2017–2019. Furthermore, countries from Middle, East, and West Asia with actual or potential possibility of trade relationships with Indonesia are selected.

3. Results and discussion

Table 1 presents descriptive statistics of the data during 2010–2019.

Table 1. Descriptive statistics.

	Indonesia's agricultural export (USD million)	Indonesia's total export (USD million)	Indonesia's agricultural producer price index (2014-2016=100) (%)
Average	35825	175000	88
Standard deviation	3532	15537	12.8
Max	41508	201000	104
Min	30538	150000	59.4

The average value of agricultural exports was USD 35,825, which is almost 20 percent of the total country exports. Indonesia's agricultural exports have gradually gotten more competitive as its producer price index has declined. Calculated indexes of comparative advantage for Indonesia and its competitors are reported in the following tables. In all tables, the index with a value greater than unity indicates the existence of comparative advantage for the given product in the given country. Obtained results are presented and discussed for different regions.

3.1 Middle Asia

Table 2 shows the computed new RCA and RSCA (in parentheses) indexes for countries in Middle Asia.

Table 2. Estimated new RCA and (RSCA) indexes for Middle Asia and Indonesia.

Product	Indonesia	Afghanistan	Kazakhstan	Kyrgyzstan	Mongolia	Tajikistan
Almond	0.52 (-0.32)	0.42 (-0.41)	–	1.6 (0.23)	–	0.78 (-0.12)
Apple	-	0.43 (-0.4)	0.64 (-0.22)	1.54 (0.21)	–	1.41 (0.17)
Apricot	-	1.15 (0.07)	0.41 (-0.42)	1.07 (0.03)	–	1.05 (0.02)
Rubber	1.33 (0.14)	–	0.22 (-0.64)	0.14 (-0.75)	0.24 (-0.61)	0.33 (-0.50)
Cocoa	1.53 (0.21)	–	0.51 (-0.19)	0.32 (-0.52)	-	0.18 (-0.69)
Rice	0.72 (-0.16)	0.51 (-0.32)	0.96 (-0.02)	0.71 (-0.17)	0.37 (-0.46)	0.69 (-0.18)
Grapes	0.62 (-0.23)	0.95 (-0.03)	0.88 (-0.06)	0.27 (-0.57)	–	2.50 (0.43)
Tea	1.29 (0.13)	0.63 (-0.23)	0.55 (-0.29)	0.61 (-0.24)	0.48 (-0.35)	0.88 (-0.06)
Corn	1.15 (0.07)	–	1.21 (0.10)	1.04 (0.02)	0.39 (-0.44)	0.74 (-0.15)
Peanuts	1.66 (0.25)	–	–	1.12 (0.06)	0.54 (-0.30)	1.16 (0.07)
Nuts	1.07 (0.03)	–	–	1.57 (0.22)	1.08 (0.04)	0.76 (-0.14)
Palm Oil	2.23 (0.38)	–	0.23 (-0.63)	0.24 (-0.61)	0.18 (-0.69)	0.14 (-0.75)
Potato	0.45 (-0.38)	0.82 (-0.15)	0.88 (-0.06)	0.86 (-0.08)	1.22 (0.10)	1.06 (0.03)
Tobacco	1.16 (0.07)	–	0.65 (-0.21)	1.08 (0.04)	–	0.33 (-0.50)
Tomato	0.45 (-0.38)	–	1.01 (0.005)	0.89 (-0.06)	–	1.42 (0.17)
Coconut	1.26 (0.12)	–	0.92 (-0.04)	0.84 (-0.09)	–	0.41 (-0.42)
Spices	1.52 (0.21)	0.6 (-0.25)	0.74 (-0.15)	1.1 (0.009)	–	1.22 (0.10)

It can be seen that Indonesia has advantage in rubber, cocoa, tea, peanuts, palm oil, tobacco, coconut, and spices. The three highest value of index relates to palm oil (2.23), peanuts (1.66), and cocoa (1.53), implying that Indonesia has a great advantage over its rivals in terms of palm oil export in Middle Asia. Other findings revealed Kyrgyzstan's advantage in the production and export of almond, apple, and nuts, Afghanistan in apricot, Kazakhstan in rice and corn, Tajikistan in grapes and tomato, and Mongolia in potato. Therefore, Indonesian officials should consider the studied Middle Asian countries as potential export markets for eight products with the value of new RCA index greater than unity (positive RSCA).

3.2 East Asia

Table 3 reports the results of new RCA and RSCA (in parentheses) indexes calculated for East Asia.

Table 3. Estimated new RCA and (RSCA) indexes for East Asia and Indonesia.

Product	Indonesia	Bhutan	Nepal	Malaysia	Vietnam	China	Thailand	Japan	Philippines	South Korea
Apple	-	2.27 (0.39)	1.39 (0.16)	-	-	3.7 (0.57)	-	2.46 (0.42)	-	1.83 (0.29)
Apricot	-	-	2.51 (0.43)	-	-	2.37 (0.41)	-	2.35 (0.40)	-	-
Cherry	-	-	-	-	-	2.76 (0.47)	-	2.46 (0.42)	-	-
Rice	1.87 (0.30)	0.98 (-0.01)	1.21 (0.09)	1.62 (0.24)	1.17 (0.08)	2.49 (0.43)	2.89 (0.49)	2.4 (0.41)	2.7 (0.46)	2.66 (0.45)
Garlic	3.26 (0.53)	1.64 (0.24)	2.02 (0.34)	-	-	2.24 (0.38)	2.52 (0.43)	2.57 (0.44)	2.39 (0.41)	2.69 (0.46)
Grapes	-	-	-	-	-	1.25 (0.11)	3.04 (0.51)	2.27 (0.39)	2.42 (0.42)	2.39 (0.41)
Palm Oil	2.46	0.75	0.65	-	-	0.45	1.12	0.32	0.87	0.38

Product	Indonesia	Bhutan	Nepal	Malaysia	Vietnam	China	Thailand	Japan	Philippines	South Korea
	(0.42)	(-0.14)	(-0.21)			(-0.38)	(0.06)	(-0.52)	(-0.07)	(-0.45)
Nuts	1.35 (0.15)	-	-	-	-	3.31 (0.54)	2.21 (0.38)	-	3.54 (0.56)	1.48 (0.19)
Orange	2.9 (0.48)	3.27 (0.53)	2.67 (0.46)	2.72 (0.46)	1.17 (0.08)	2.89 (0.49)	1.85 (0.30)	2.52 (0.43)	2.98 (0.50)	-
Potato	2.4 (0.41)	1.96 (0.32)	2.12 (0.36)	-	0.93 (-0.04)	1.41 (0.17)	2.92 (0.49)	1.87 (0.30)	2.29 (0.39)	4.2 (0.62)
Spices	3.15 (0.52)	4.03 (0.60)	-	-	-	3.61 (0.57)	-	-	-	-
Tea	1.79 (0.28)	-	1.3 (0.13)	-	2.45 (0.42)	0.8 (-0.11)	0.93 (-0.04)	1.44 (0.18)	-	1.15 (0.07)
Tobacco	3.61 (0.57)	2.98 (0.50)	2.56 (0.44)	3.28 (0.53)	1.79 (0.28)	2.51 (0.43)	1.23 (0.10)	2.21 (0.38)	2.66 (0.45)	2.26 (0.39)
Tomato	2.04 (0.34)	2.15 (0.37)	2.19 (0.37)	3.02 (0.50)	-	4.04 (0.60)	2.59 (0.44)	2.34 (0.40)	3.02 (0.50)	2.1 (0.35)

According to this table, Indonesia has an advantage in the production and export of three products, i.e., palm oil (2.46), tobacco (3.61), and garlic (3.26). Thus, these Indonesian products can enter the East Asian markets at lower prices than those of rival countries, implying the existence of comparative advantage for Indonesia. This was previously reported in Proudman and Redding (2000). China produces apple, cherry, and tomato at relatively lower cost, as new RCA value is calculated at 3.70, 2.76, and 4.04, respectively. Our finding revealed Nepal's advantage in apricot production with an index value of 2.51. Thailand showed a greater advantage in rice and grapes production (2.89 and 3.04, respectively). Vietnam is an efficient producer of tea since its cost of production is lower than the other countries in the study. The small country of the region, Bhutan, produces orange more efficiently than its regional neighbors (3.27).

To gain a chance of presence in East Asian markets (those studied), Indonesia should reduce the cost of production through the application of appropriate technology, especially mechanization of the production process.

3.3 West Asia

In Table 4, computed new RCA and RSCA (in parentheses) indexes is reported for West Asia and some neighboring countries in the region.

Table 4. Estimated new RCA and (RSCA) indexes for West Asia and some countries in the region.

Product	Indonesia	Armenia	Azerbaijan	Jordan	Lebanon	Georgia	Turkey	Syria	Russia	Afghanistan	Cyprus
Almond	0.95 (-0.03)	_	1.77 (0.28)	0.82 (-0.1)	0.43 (-0.4)	0.84 (-0.09)	0.78 (-01)	1.04	_	_	1.38
Apple	0.78	0.65	1.69	0.69	1.01	0.80	0.98	1.03	1.02	1.08	1.63
Apricot	0.56	0.68	0.59	1.06	2.01	0.68	1.21	0.92	1.12	0.91	0.90
Cabbage	0.93	0.82	1.06	1.08	1.50	0.73	0.76	1.09	0.90	0.69	1.15
Cherry	1.05	0.83	0.77	0.62	1.02	1.60	0.99	0.94	1.12	_	0.48
Garlic	1.62	0.75	1.32	0.56	0.66	_	2.07	0.55	1.17	0.98	1.06
Grapes	0.95	0.97	0.89	0.58	1.03	0.92	1.29	1.41	1.22	1.12	0.61
Lemon	0.54	_	0.69	0.93	1.06	_	1.86	1.18	_	1.07	0.93
Nuts	0.96	_	1.99	_	0.69	0.95	0.90	1.17	0.98	_	_
Orange	1.01	_	0.57	1.10	1.34	0.78	0.95	1.14	_	1.04	1.03
Peach	1.33	0.73	0.81	1.09	1.41	1.15	0.99	1.03	1.08	0.65	0.67
Potato	0.85	0.57	1.14	0.82	1.07	0.91	0.95	1.11	1.05	1.66	1.06
Spices	1.54	_	1.07	_	1.05	0.82	1.22	1.45	_	_	_
Tea	1.24	_	0.79	_	_	1.27	0.94	_	1.10	_	_
Tobacco	1.25	1.02	0.97	0.45	0.42	0.76	0.48	0.48	0.45	1.10	0.51
Tomato	0.98	0.99	0.46	1.09	1.32	0.85	1.03	1.11	1.19	0.72	0.87
Vegetables	0.89	0.43	0.55	0.95	0.71	0.97	0.93	1.05	1.01	1.87	1.59
Rice	1.24	_	0.87	_	0.54	1.33	0.78	_	0.88	_	1.21

Product	Indonesia	Armenia	Azerbaijan	Jordan	Lebanon	Georgia	Turkey	Syria	Russia	Afghanistan	Cyprus
Palm Oil	1.41	0.13	0.15	1.03	0.75	0.21	0.36	0.52	0.23	0.38	0.49

Due to the lack of producer price data for some nations in West Asia, we decided to undertake calculations for selected neighboring countries in the region, including Armenia, Azerbaijan, Georgia, Turkey, Russia, and Cyprus. The highest value of index for three products, i.e., spices (1.54), tobacco (1.25), and palm oil (1.41), belongs to Indonesia, implying that these crops are produced at a lower cost in comparison with other countries, and, therefore, Indonesia has a comparative advantage over its competitors. This finding is in line with those reported by Riaz and Jansen (2012). Also, Indonesia is ranking second for garlic (1.62), peach (1.33), tea (1.24), and rice (1.24). Therefore, West Asia and neighboring countries could be a good destination for the above seven Indonesian products. This potential opportunity needs proper governmental policies to come into reality. Azerbaijan shows the highest advantage for almond, apple, and nuts. Turkey, the country with great agricultural lands, produces garlic and lemon at more competitive prices. Other findings confirmed Syria's advantage in grapes production with a new RCA value at 1.41.

4. Conclusion

With millions of hectares of arable land across over 17,000 islands, Indonesia's agricultural sector has long been an integral part of the economy. While the contribution of agriculture to the GDP has declined during the last two decades (as a result of economic development, which is a common phenomenon for all countries), it still remains highly important as it provides

job opportunities for almost one-third of the country's workforce. Although large-scale companies dominate Indonesia's agriculture from a revenue standpoint, small-scale farmers who often operate in hard-to-reach rural areas comprise the backbone of the sector.

Indonesia is the fourth most populous country in the world, with an estimated population of 270 million people in 2020, and the largest economy in Southeast Asia. To meet population demand for agricultural products, it relies on imports from countries such as the United States, China, Brazil, Australia, and Argentina, with an origin of 57 percent of total agricultural imports. As indicated in the Strategic Plan of the Indonesian Ministry of Agriculture 2020–2024 (part of the Medium-Term National Development Plan), achieving a self-reliant, developed, and prosperous agricultural community through increasing food security and agricultural competitiveness are defined as the main objectives of the government.

To raise competitiveness, it is necessary to first enhance productivity in production and, second, to gather information about competitors in different markets. This study is an empirical attempt to examine the comparative advantage of the main Indonesian agricultural products in Asia. We considered countries with accessible data for the period 2017–2019 from three regions of the continent (Middle, East, and West Asia). The newly developed measure of comparative advantage (new RCA) and revealed symmetric comparative advantage (RSCA) indexes are calculated for Indonesia and some selected countries (as Indonesia's competitors) in these three regions. The main findings showed that in all regions, Indonesia has a comparative advantage in the production and export of its traditional export products, including palm oil, spices, and tobacco. Furthermore, we found that for some products, including

rice and garlic in West Asia, there is a possibility of export for Indonesia if its competitiveness could be slightly improved. Here, investment in production technology, which results in lower production costs, could be the main policy recommendation. In the short- and mid-term, however, preferential trade with those countries desiring a trade relationship with Indonesia is another policy leading to more presence of Indonesian agricultural products in the Asian markets. Moreover, Indonesian officials should continuously monitor all competitors' domestic and export policies to make proper policy adjustments, ensuring a stable market share in the studied markets.

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