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ANALYSIS OF THE EXPORT COMPETITIVENESS OF FRUITS UNDER HS CODE 080450 (GUAVA, MANGO, AND MANGOSTEEN) FROM INDONESIA IN THE INTERNATIONAL MARKET

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Abstract. Tropical fruits such as mango, mangosteen, and guava are among Indonesia's leading horticultural products. Mangosteen fruit is the largest export to Indonesia's total fruit exports. However, Indonesia's mangosteen export share is still very low, and this should be maximized. Mango also has promising export opportunities as it occupied the 21st position as an exporting country in 2021. Guava also has same condition with an increase in export and already having markets abroad, such as Singapore and Korea. This study aims to analyze the competitiveness of Indonesian mangosteen exports in the international market and compare with other mangosteen-exporting countries in the international market to determine the factors that affect mangosteen competitiveness. The data used are secondary data from 2003 to 2022. The analysis methods used were RCA, ECI, TSI and multiple regression analysis were used. The RCA analysis results show that Indonesian mangosteen has a comparative advantage with a value of 1.053. The results of the ECI analysis show that Indonesian mangosteen has a competitive advantage and experiences an increasing export trend with a value of 1.217 and TSI shows that Indonesia tends to be a mangosteen exporting country and is at the maturity stage with a value of 0.903. However, Indonesia's competitive position is still below that of other countries such as Thailand, India, Peru and Kenya. Factors that significantly affect Indonesia's RCA are Indonesia's and Thailand's export volume and Indonesia's export prices.

Keywords: Competitiveness, ECI, Factors, RCA, TSI

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INTRODUCTION

Indonesia is an agrarian country with substantial agricultural potential. Horticulture is one of its agricultural subsectors, which includes fruits, vegetables, ornamental plants, and biopharmaceutical crops. Indonesia's leading tropical fruit commodities include bananas, durians, pineapples, mangosteens, citrus fruits, and mangoes. Mangosteen (Garcinia mangostana Linn) is one of the tropical

fruit commodities belonging to the family Clusiaceae and is known as “the queen of fruits” due to its exotic taste, attractive rind, and clean white flesh with a reddish hue. Mangosteen also provides various health benefits, including antioxidant, anticancer, and anti-inflammatory properties, as well as the ability to regulate blood glucose levels.

Mangosteen currently ranks first among Indonesian fruit commodities in terms of export volume. From a global production perspective, Indonesia ranks fifth in mangosteen production after India, China, Kenya, and Thailand (Suindiantarini & Aswitarit, 2019). Although Indonesia is the world’s fifth-largest mangosteen producer, the contribution of mangosteen exports to total domestic production remains relatively low. During the 2018–2022 period, the highest export share reached only 17.5 percent, which occurred in 2018. Given Indonesia’s large production capacity, mangosteen should present significant export potential. Furthermore, global demand for mangosteen continues to increase as public awareness of its medicinal properties grows (Nuraniputri et al., 2016).

Mango (Mangifera indica L) is also one of Indonesia’s flagship tropical fruits. Mango contains various phytochemicals, nutrients, dietary fiber, vitamin C, provitamin A, and polyphenols. The Ministry of Agriculture 2023b states that Indonesia’s mango export development prospects are highly promising; however, its competitiveness still needs to be strengthened and given greater attention. According to a press release from the Ministry of Trade, Indonesia ranked 21st among mango-exporting countries in 2021, with major destination markets including Singapore, Canada, and the United States. Mangoes and mangosteens fall under the Harmonized System (HS) classification used in international trade by the United Nations under HS Code 080450, which also includes guava. Guava also shows potential in the international market, as evidenced by a 76 percent increase in exports in 2018. Indonesian guava has already entered markets such as Singapore, Malaysia, South Korea, Kuwait, and Saudi Arabia.

International trade inevitably involves competition among exporting countries. The presence of global producers of guava, mango, and mangosteen necessitates continuous export development over a relatively long period, driven by improvements in product quality and its competitive capability. Export opportunities increase in line with higher levels of competitiveness. The degree of competitiveness of a commodity can be assessed through comparative and competitive advantage analyses (Yudha et al., 2022).

Competitiveness plays a crucial role in determining the value of a commodity. Highly competitive Indonesian commodities are more likely to gain recognition in both domestic and international markets. Several factors can influence competitiveness, including production levels, land area, export volume, exchange rates, competition from other exporting countries, government policies, and export barriers (Gunawiredja, 2022). Based on the above background, this study aims to examine the competitiveness of Indonesian mangosteen exports and the factors affecting their performance in the international market.

Previous studies on the competitiveness of Indonesian mangosteen exports (HS Code 080450) have been conducted by Yudha et al.,(2022), focusing on destination countries namely Thailand, Hong Kong, and Malaysia during the 2014–2018 period using RCA and TSI analyses. Examining factors for mangosteen competitiveness (HS Code 080450), Indonesian production showed a significant positive effect, exports a significant negative effect, exchange rate a positive but insignificant effect, and demand a negative but insignificant effect on Indonesia's competitiveness internationally.

Based on the background described above, this study seeks to analyze: (1) the level of comparative and competitive advantages of Indonesian guava, mango, and mangosteen exports in the international market; (2) the competitive position of Indonesian guava, mango, and mangosteen exports relative to other exporting countries in the international market; and (3) the effects of independent variables on the dependent variable, namely Indonesia’s Revealed Comparative Advantage (RCA). The novelty of this study lies in its extended observation period covering the last 20 years, the use of

additional analytical tools beyond RCA and TSI by incorporating the Export Competitiveness Index (ECI), and the examination of competitiveness determinants using different independent variables, namely non-tariff barriers (dummy variable) and the export volumes of competing countries.

METHOD

This study uses secondary data as its reference and focuses on the competitiveness of commodities under HS Code 080450 (fresh or dried guavas, mangoes, and mangosteens), along with several factors that influence competitiveness during the period from 2003 to 2022. The HS classification applied in this study is HS Code 080450. The study employs a literature review as the data collection technique, with data obtained from previous studies and relevant official institutions that provide reliable and accountable sources. The data are processed using Microsoft Excel 2016, EViews, and SPSS software. The analytical tools employed in this study are as follows:

***Revelead Comparative Advantage* (RCA)**

The RCA method is a method that is used to analyze comparative competitiveness. RCA can be formulated as follows (Rahmadhani, 2018):

$$RCA = \frac{(^{Xikj}/_{Xkj})}{(^{Xij}/_{Xj})} \qquad (1)$$

Where: Xikj = export value of a specific commodity of country (k) in year (j); Xkj = total export value of country (k) in year (j); Xij = world export value of a specific commodity in year (j); Xj = total world export value in year *(j);* j = year 1, 2, …, *j.*

Criteria:

RCA > 1 = indicates a comparative advantage or strong competitiveness

RCA < 1 = indicates no comparative advantage or weak competitiveness.

Export Competitiveness Index

The Export Competitiveness Index (ECI) is an indicator that compares a country's export ratio of a specific commodity in a given market and period with its export ratio for the same commodity in the previous period. ECI is a method used to measure the level of competitive advantage of a commodity (Wahyuningsih et al., 2022). The ECI formula is presented as follows:

$$ECI = \frac{(^{Xij}/_{Xiw})t}{(^{Xij}/_{Xiw})t-1} \qquad (2)$$

Where : Xij = export value of a specific commodity of country *(j);* Xiw = world export value of a specific commodity; t = current period; t-1 = previous period

Criteria:

ECI > 1 = indicates that the commodity has a competitive advantage and is experiencing an increasing competitiveness trend.

ECI < 1 = indicates that the commodity does not have a competitive advantage or is facing a declining competitiveness trend.

Trade Specialization Index (TSI)

The Trade Specialization Index (TSI) is used to analyze the position of export competitiveness. The TSI can be described as follows:

$$TSI = \frac{(Xij-Mij)}{(Xij+Mij)} \qquad (3)$$

Where: Xij = export value of a specific commodity from country *(j)*; Mij = import value of a specific commodity of country *(j)*.
Criteria:
Positive TSI = strong competitiveness / net exporter
Negative TSI = weak competitiveness / net importer
The TSI identifies the stage of a product's development in international trade across five phases, as follows:

1. Introduction stage ($-1 < TSI \leq -0.5$)
2. Import substitution stage ($-0.51 < TSI \leq 0$)
3. Growth stage ($0.01 < TSI \leq 0.8$)
4. Maturity stage ($0.81 < TSI \leq 1$)
5. Re-import stage ($1 > TSI \leq 0$) (Riniwati et al., 2020).

Multiple Regression Analysis

Multiple linear regression analysis is employed to examine the effect of the independent variables on the dependent variable. In this study, the analysis focuses on identifying the factors that influence Indonesia's RCA. The regression model is specified as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \mu \quad (4)$$

Where: Y= RCA of Indonesian mangosteen; β0= constant term; β1,β2....β6 = regression coefficients; X1= export volume of HS 080450 commodities from Indonesia (tons); X2 = export volume of HS 080450 commodities from Thailand (tons); X3 = dummy variable for Technical Barriers to Trade (TBT); X4 = dummy variable for Pre-Shipment Inspection and Other Formalities; X5 = dummy variable for non-automatic licensing, quotas, prohibitions, and quality control measures other than SPS or TBT; X6 = export price of HS 080450 commodities from Indonesia (US$/ton); μ = error term.

RESULT AND DISCUSSION

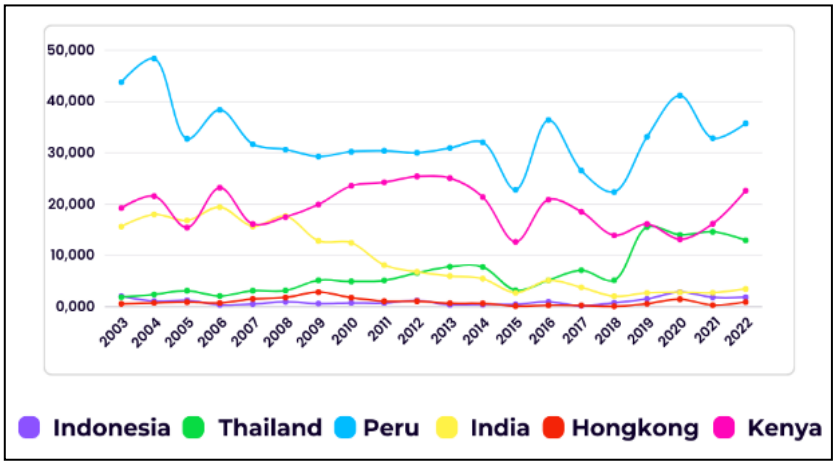
Export–Import Dynamics of HS Code 080450 Commodities (Guava, Mango, and Mangosteen) in Indonesia

The export capacity of guava, mango, and mangosteen commodities in Indonesia has generally shown an upward trend, although it has fluctuated considerably from year to year, with periods of both significant increases and declines. A substantial decline occurred in 2017, when export volume fell from 35,660 to 10,039 tons, representing a decrease of 71.85%. Conversely, a significant increase was recorded in 2018, when exports rose from 10,039 tons to 39,817 tons, which is equivalent to an increase of 296.62 percent. This fluctuation was largely attributable to China's import ban on Indonesian mangosteen in 2017, which led to a sharp decline in export volumes. In 2018, the reopening of the Chinese market resulted in a substantial recovery in Indonesia's export volume.

The increasing demand for fruits, particularly mangosteen, is driven by its numerous health benefits. In addition, mangosteen is widely used as a raw material in the pharmaceutical and cosmetic industries. However, Nuraniputri *et al.* (2016) argue that the increase in mangosteen export activities has not been accompanied by improvements in product quality. Therefore, the issue of low export-quality mangosteen requires solutions. Meanwhile, Indonesia's import volume of guava, mango, and mangosteen has shown a declining trend over the past 20 years. Import volumes of those fruits tend to decrease from thousands of tons (approximately 1,000 tons) to only tens of kilograms, reaching around 14 kg in 2022.

***Revelead Comparative Advantage* (RCA)**

Export performance and competitiveness can be assessed through the lens of comparative advantage. This study uses the Revealed Comparative Advantage (RCA) method to analyze the comparative competitiveness of Indonesian guava, mango, and mangosteen exports relative to other international exporting countries. The RCA results indicate that five exporting countries—Indonesia, Thailand, Peru, India, and Kenya—possess comparative advantages and strong competitiveness in the international market during the 2003–2022 period, as reflected by RCA values greater than one. In contrast, Hong Kong recorded an RCA value below one (0.937), indicating that it does not possess a comparative advantage and exhibits relatively weak competitiveness in guava, mango, and mangosteen commodities in the international market.



Source: Secondary Data (2023), Processed.

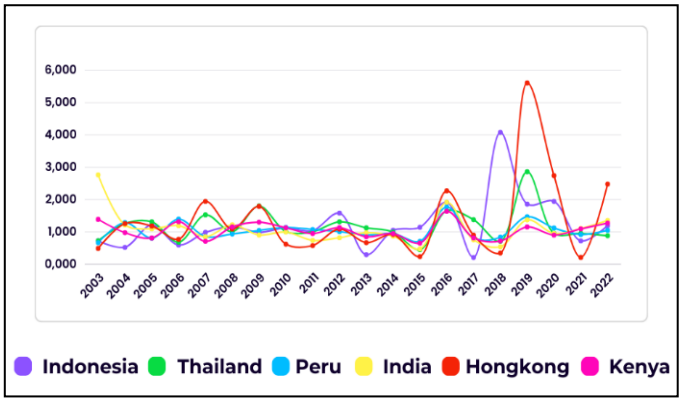
Figure 1. RCA trends of six exporting countries, 2003–2022

As shown in Figure 1, the average RCA value of Indonesia during the 2003–2022 period basd on calculation is 1.053, indicating that Indonesia possesses a comparative advantage and relatively strong competitiveness in the international market for guava, mango, and mangosteen commodities. This finding is consistent with the study by Rahmadhani (2018), which analyzed the international market during the 2001–2015 period and found that Indonesian fruit commodities exhibited relatively strong competitiveness and a comparative advantage. Indonesia's RCA values tend to fluctuate over the observation period, with the lowest value recorded in 2017 at 0.189, while the highest value observed in 2020 at 2.871. The low RCA value in 2017 was partly attributable to China's import ban on Indonesian mangosteen, which led to a decline in export values. China is one of Indonesia's main export markets for mangosteen. In contrast, the increase in RCA value in 2020 was influenced by the COVID-19 pandemic, which heightened public awareness of the health benefits of fruit consumption, particularly mangosteen. This trend is supported by a statement from the Head of the Agricultural Quarantine Agency 2020, who noted that global demand for mangosteen increased during the COVID-19 pandemic.

Indonesia's RCA value remains relatively lower than that of the other five exporting countries due to its lower export volume and export value compared to most competitors, except Kenya. Although Kenya's export volume and export value are not substantially different from those of Indonesia, the high contribution of guava, mango, and mangosteen exports to Kenya's total national exports results in a higher RCA value. These findings indicate that Indonesia needs to further enhance the competitiveness of its guava, mango, and mangosteen commodities in order to remain competitive with other major exporting countries in the international market (Nurjati, 2022; Baroh, 2022).

***Export Competitiveness Index* (ECI)**

The Export Competitiveness Index (ECI) is an analytical tool used to assess the competitiveness of a commodity in terms of its competitive advantage. ECI indicates a comparison of a country's export market share in the international market for a specific product or commodity in a given period relative to the previous period.



Source: Secondary Data (2023), Processed.

Figure 2. ECI Trends of Six Exporting Countries, 2003–2022

The ECI results indicate that the average values of the six countries during the 2003–2022 period are close to one, suggesting that all countries possess competitive advantages and experience increasing export trends. Figure 2 shows that the ECI values of the six countries are relatively similar, as reflected by overlapping trend lines. A comparison among the six countries over the 2003–2022 period reveals that Hong Kong recorded the highest average ECI value at 1.390, followed by Indonesia at 1.217, Thailand at 1.180, India at 1.105, Kenya at 1.045, and Peru at 1.037. Indonesia's mangosteen exports demonstrate strong competitive capability and an increasing export trend in the global market.

Based on the calculation results, Indonesia's average ECI during the period 2003–2022 was 1.217, indicating that Indonesia's mangosteen export activities in the international market possess a competitive advantage and exhibit an increasing export trend, enabling Indonesia to compete with other exporting countries in the global market. However, this value is still lower than that of Hong Kong; therefore, the upward export trend needs to be maintained. The relatively high ECI value for Indonesia is also supported by the annual growth of export values, which shows an increasing trend with an average growth rate of 40.32 percent. The export volume which tend to increase is another factor contributing to Indonesia's high ECI, as the ECI compares export values in a given period with those of the previous period. Consequently, higher export volumes and values in subsequent periods lead to higher ECI values. These findings are consistent with the study by Rahmadhani (2018), which reported an ECI value greater than one, namely 1.155, during the 2001–2015 period. The ECI is strongly influenced by the export volume of a commodity; therefore, export quantity plays a significant role in determining export competitiveness. A country is considered to have a competitive advantage if it is able to export products that meet foreign market demand requirements and generate greater economic benefits. An increase in export volume can enhance the ECI value, and vice versa (Pangestu et al., 2022).

Factors Affecting the Competitiveness of Indonesian Mangosteen

Multiple Regression Analysis

This analysis examines several factors that may influence the export competitiveness of Indonesian mangosteen in the international market by employing multiple linear regression. The

objective is to draw conclusions regarding the factors and variables that affect competitiveness based on comparative advantage (RCA). To identify the determinants of Indonesian mangosteen export competitiveness in the international market, a series of statistical tests was conducted. Prior to estimating the regression model, classical assumption tests were performed as prerequisite tests to ensure compliance with the *Best Linear Unbiased Estimator* (BLUE) criteria. After all classical assumptions were satisfied, the regression results were obtained with RCA as the dependent variable, as presented in Table 1.

Table 1. Results of the multiple regression analysis

Method:		*Least Square*
Sample:		2003-2022
Included observations:		20
Variabel	*Coefficient*	*Probability*
C	0,915885	0,0929
X2	0,0000463	0,0126*
X3	-0,00000321	0,0449*
X5	-0,560031	0,1789
X6	-0,432150	0,2086
X7	-0,299880	0,2365
X11	0,630144	0,0259
R-Squared		0,725564
F-Statistics		5,728322
Prob (F-statistics)		0,004151

Source: Data Processed, 2025

$$Y = 0{,}915885 + 0{,}0000463X_1 - 0{,}00000321X_2 - 0{,}560031X_3 - 0{,}432150X_4 - 0{,}299880X_5 + 0{,}630144X_6$$

The results of the analysis show that the R-squared value is 0.725, indicating that 72.5 percent of the export competitiveness of Indonesian HS Code 080450 commodities (guavas, mangoes, and mangosteens), as measured by RCA in the international market, is explained by the variables included in the model, while the remaining proportion is influenced by other variables not included in the model. The probability value of the F-statistic is 0.004151, which is less than 0.05, indicating that the independent variables jointly and significantly affect the dependent variable, namely Indonesia's RCA.

Export Volume Variable of HS Code 080450 Commodities (Guavas, Mangoes, and Mangosteens) in Indonesia

Based on the results of the analysis, the probability value is 0.0126, which is smaller than α (0.05); therefore, H_0 is rejected. This indicates that Indonesia's export volume has a significant effect on Indonesia's RCA. The coefficient of this variable is 0.0000463, meaning that an increase of one unit in Indonesia's mangosteen export volume, ceteris paribus, will increase the RCA value of Indonesian guavas, mangoes, and mangosteens by 0.0000463 from its previous level. This finding is consistent with the study by Subekti 2020 which found that Indonesia's mangosteen export volume has a significant and positive effect on the competitiveness of Indonesian mangosteen. Similarly, Ratnasari *et al*. (2020), in their study on tea commodities, reported that Indonesia's tea export capacity has a substantial impact on the competitiveness (RCA) of Indonesian tea. Ginting *et al.* (2021) stated that improvements in competitiveness need to be supported by increasing export capacity in the country. The findings of this study are also in line with the theory that "the higher the export volume of a country's commodity, the higher its export competitiveness; conversely, the lower the export volume, the lower its export competitiveness" (Rahmansyah *et al*., 2021).

Export Volume Variable of HS Code 080450 Commodities (Guavas, Mangoes, and Mangosteens) in Thailand

Based on the results of the analysis, the probability value is 0.0449, which is smaller than α (0.05); therefore, H_0 is rejected. This indicates that Thailand's export volume has a significant effect on Indonesia's RCA. The coefficient of this variable is −0.0000321, meaning that an increase of one unit in Thailand's export volume of guavas, mangoes, and mangosteens, ceteris paribus, will reduce Indonesia's RCA for these commodities by 0.0000321 from its previous level. This implies that when Thailand's export volume of guavas, mangoes, and mangosteens in the international market increases, Indonesia's competitiveness declines due to intensified competition, particularly in mangosteen exports. Thailand shares the same main mangosteen export markets as Indonesia, namely China and Malaysia. China is Indonesia's largest mangosteen export destination, where import demand is highly competitive with mangosteens originating from Thailand (Situmorang et al., 2023).

Technical Barriers to Trade (TBT) Variable

Based on the analysis, the probability value is 0.1789, which is greater than α (0.05); therefore, H_0 is accepted. This indicates that Technical Barriers to Trade do not have a significant effect on Indonesia's RCA. TBT refers to measures related to technical regulations and conformity assessment procedures (UNCTAD, 2019). The results show that TBT does not have a significant impact on the competitiveness (RCA) of Indonesian guavas, mangoes, and mangosteens. Trade policies imposed by importing countries may or may not constitute barriers depending on how exporting countries respond, the cooperation established between trading partners, and other strategic interests (Ghodsi & Stehrer, 2020). This suggests that Indonesia has been able to meet importing countries' requirements related to labeling, packaging, and certification.

Pre-Shipment Inspection and Other Formalities Variable

Based on the analysis, the probability value is 0.6732, which is greater than α (0.05); therefore, H_0 is accepted. This indicates that this non-tariff barrier does not have a significant effect on Indonesia's RCA. This measure relates to mandatory inspections of goods prior to shipment, including quality, quantity, and price controls before export from the exporting country (UNCTAD, 2019*)*. The findings indicate that this variable does not significantly affect the competitiveness (RCA) of Indonesian guavas, mangoes, and mangosteens. This implies that Indonesia has been sufficiently capable of meeting pre-shipment requirements before the commodities are exported to importing countries (Beverelli et al., 2022).

Non-Automatic Licensing, Quotas, Prohibitions, and Quality Control Measures Other Than SPS or TBT Reasons Variable

Based on the analysis, the probability value is 0.6732, which is greater than α (0.05); therefore, H_0 is accepted. This indicates that this non-tariff barrier does not significantly affect Indonesia's RCA. These measures relate to control actions generally intended to restrict or prohibit imports, including limitations on the types of goods that may be imported. The results show that this variable does not significantly affect the competitiveness (RCA) of Indonesian guavas, mangoes, and mangosteens. Such measures are not widely applied by importing countries, and when implemented, they are primarily intended to protect domestic products; therefore, they do not significantly influence Indonesia's export volume or competitiveness (UNCTAD, 2019).

Export Price Variable of HS Code 080450 Commodities (Guavas, Mangoes, and Mangosteens) in Indonesia

Based on the analysis, the probability value is 0.0264, which is smaller than α (0.05); therefore, H_0 is rejected. This indicates that the export price of Indonesian guavas, mangoes, and mangosteens has a significant effect on Indonesia's RCA. The coefficient of this variable is 0.000652, meaning that an increase of one unit in Indonesia's export price, ceteris paribus, will increase Indonesia's RCA by 0.000652 from its previous level.

This finding is consistent with the study by (Ginting et al., 2021), which found that export prices of processed cocoa have a significant and positive effect on competitiveness (RCA) in the international market. Similarly, research by Ratnasari *et al.* (2020) reported that export prices significantly influence the competitiveness of Indonesian tea in international markets.

Cocoa prices have a strong and positive influence on cocoa competitiveness in Indonesia. These findings align with the law of supply, which states that price and quantity supplied are positively related: when prices increase, producers tend to increase production to obtain higher profits, and vice versa. "When the price of a product is high, producers tend to increase their production because they can obtain higher profits. An increase in prices is therefore expected to lead to higher export volumes, which in turn is accompanied by an improvement in export competitiveness (Ginting et al., 2021).

CONCLUSION

The results show that Indonesian guava, mango, and mangosteen commodities (HS 080450) during the 2003–2022 period exhibit a comparative advantage (RCA = 1.053), increasing competitive competitiveness (ECI = 1.217), and tend to function as net exporters at the maturity stage (TSI = 0.903). However, Indonesia's competitiveness position remains below that of Thailand, Peru, India, and Kenya. The factors that significantly influence competitiveness (RCA) are Indonesia's export volume, Thailand's export volume, and Indonesia's export price, while non-tariff barriers do not have a significant effect. To enhance competitiveness, the government should promote export volume growth by expanding access to international markets, particularly toward new potential destination countries; improve product quality and standardization by strengthening quality control, certification, and post-harvest handling to enhance product competitiveness; support product diversification and downstream processing (e.g., processed mangosteen products, juice, or extracts) to increase value added; strengthen international trade cooperation to reduce technical barriers and expand distribution networks; and provide export incentives and facilities such as export financing, cold-chain logistics, and overseas trade promotion.

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