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Evaluation of Export Position and Non-Tariff Barrier Ave for Indonesian Coffee Compared with Major Exporters

Evaluasi Posisi Ekspor dan Halangan Non-Tarif Kopi Indonesia Dibandingkan dengan Pengekspor Utama

Nazla Atikah Hikmatias Nasution[1], Sahara[1], Novindra[2]

[1]Department of Economics, Faculty of Economics and Management, IPB University
[2]Department of Environmental Resource Economics, Faculty of Economics and Management, IPB University
Agatis Street, Kampus IPB Dramaga, Bogor 16680, Indonesia
Correspondence: atikahnazla@apps.ipb.ac.id

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ABSTRACT

The trend in coffee export volumes has fluctuated, indicating instability in supply chain and international market demand, resulting in Indonesia's coffee competitiveness not being optimal compared to main exporting competitors. This weakened competitiveness is due to non-tariff barriers imposed by destination countries. This study focuses on evaluating Indonesia's coffee export position with other major exporting countries and calculate the estimated Ad Valorem Equivalent (AVE) of non-tariff barriers imposed by destination countries. This study aims to analyzing Indonesia's coffee export position compared with major exporting countries and estimate the Ad Valorem Equivalent (AVE) of non-tariff barriers imposed by importing countries. This study uses secondary time-series and cross-sectional data covering the period 2005–2024 obtained from UN Comtrade, ITC TradeMap, UNCTAD TRAINS, World Bank, International Coffee Organization (ICO), and other related institutions. The analysis employs Revealed Comparative Advantage (RCA), Export Competitiveness Index (ECI), Export Product Dynamics (EPD), and AVE estimation methods. The results show that Indonesia's RCA value is above 1 but still low compared to competing countries, while EPD results show unstable export positions in various markets. AVE estimates also show that Indonesian coffee faces significant non-tariff barriers that vary between countries, with high SPS and TBT values indicating asymmetric impact on Indonesia's export competitiveness. Indonesia's coffee export competitiveness still lags major exporting countries, showed by moderate RCA values and unstable market positions. High AVE SPS and TBT values indicate that non-tariff barriers pose challenge for Indonesian coffee exporters.

Keywords: Ad-Valorem Equivalent, competitiveness, coffee exports, export market position, non-tariff barriers
JEL classification: C22, F13, Q17

*Corresponding author:
E-mail: atikahnazla@apps.ipb.ac.id

INTRODUCTION

International trade has become the main foundation of Indonesia's economic growth, with plantation commodities being one of the vital sectors in generating foreign exchange after petroleum in global trade. One of the most important plantation commodities is coffee. Its strategic position in the national plantation sector, coffee not only serves as a leading export product, but also an important source of income for farmers, processing businesses, and other parties involved in the supply chain (Yunita, 2021).

According to the data Kementerian Pertanian (2023), the national coffee industry has absorbed more than 5 million workers, both directly and indirectly, including farmers, processors, UMKM players, as well as distribution and export workers. Indonesia ranks fourth as the world's largest coffee producer after Brazil, Vietnam, and Colombia, with production reaching more than 774 thousand tons in 2023 (International Coffee Organization, 2022). Most of this production is intended for export.

The trend in coffee export volume fluctuated during the 2015-2024 period, with peak exports occurring in 2015 at around 500 tons, and the lowest point in 2018 and 2023 in the range of 2018 and 2023 in the range of 270 tons. After this decline, exports rose again but did not reach their initial point, indicating instability in the supply chain and international market demand. Other contributing factors include export policies, coffee bean quality, and global competition, as explained by Azis & Irjayanti (2023) which emphasizes the importance of logistics efficiency and production sustainability in maintaining the competitiveness of Indonesian coffee exports.

In the context of developing countries such as Indonesia, international trade provides access to foreign markets, new technologies, and foreign exchange. (Matondang *et al*., 2025). However, international trade is not entirely free from state policy intervention. Many countries still apply protectionist instruments in the form of tariff barriers and non-tariff barriers. With the decline in global trade tariffs due to tariff liberalization within the framework of the WTO and various free trade agreements, many countries are now turning to non-tariff barriers as the main instrument for regulating international trade flows.

In the global coffee trade, Indonesia faces fierce competition from major coffee producing and exporting countries, namely Brazil, Vietnam, and Colombia. The problem that Indonesia often faces is the suboptimal competitiveness of Indonesian coffee in the international market when compared to competing countries. Indonesia's coffee export performance still lags behind Brazil, Vietnam, and Colombia, as reflected in the low volume and value of exports (TradeMap, 2025).

Indonesia and the other three exporting countries not only compete in terms of production volume, but also share similar export markets. All four export coffee to various countries with high demand, and some of their export destinations are identical. Countries such as the United States, Belgium, Malaysia, Japan, and Egypt serve as export markets for these four countries due to their high levels of coffee consumption, economic stability, and their roles as distribution hubs and centers of the coffee processing industry in their respective regions. The fact that these export destinations are the same indicates that Indonesia and the other three exporting countries are in direct competition in the international market. These five export destinations actively impose non-tariff barriers on coffee products originating from Indonesia and the other three exporting countries.

Not only competitiveness issues, Indonesian coffee exports also face non-tariff barriers imposed by destination countries. Non-tariff barriers encompass two main theories in international political economy, namely the political hypothesis and the income hypothesis. The political hypothesis states that non-tariff barriers tend to be imposed by countries due to pressure from domestic interest groups, which want to protect themselves from foreign competition. (Chen & Li, 2017; Kinzius *et al*., 2019; Rojas & Pineda, 2020; Ronen, 2017). The income hypothesis states that countries with higher per capita incomes tend to impose more non-tariff barriers, because their consumers have preferences for product quality, food safety, and environmental regulations (Beghin *et al*., 2012; Cipollina & Demaria, 2020;

Orefice, 2017).

The most frequently imposed non-tariff barriers were SPS, with 37 incidents, and TBT, with 25 incidents (UNCTAD TRAINS, 2025). Research of Munadi & Saputri, (2019) shows the impact of non-tariff barriers four times higher than the impact of tariff barriers, namely 22% non-tariff and 5% tariff barriers, on the export volume of the agricultural sector. In the study of Gumelar *et al*., (2020), Non-tariff barriers to Indonesian CPO exports to the European Union amount to between 11. 2% to 14.6% based on Ad Valorem Equivalent (AVE) estimates. However, there has been little research specifically calculating the AVE of non-tariff barriers to Indonesian plantation exports, including coffee.

Previous research on identifying trade barriers to Indonesian coffee exports has been conducted, but it has been limited to a descriptive approach and has therefore not been able to identify in detail the most commonly applied types of non-tariff barriers (Ha et al., 2023; Munadi & Saputri, 2019; Nasution, 2023). One of the key features of this study is the use of the Ad-Valorem Equivalent (AVE) as a proxy for non-tariff barriers, with the aim of measuring the magnitude of non-tariff barrier costs when converted into a form equivalent to tariffs. This method has not yet been widely adopted for Indonesian agricultural commodities, including coffee.

The research of Amanda & Rosiana (2023) is the first to analyze the competitiveness of Indonesian coffee exports to international markets on an aggregate basis using the RCA and DRCA methods. There is also a study of Manalu et al., (2019) that incorporates the Export Product Dynamics (EPD) method to analyze the competitive advantages and trade position of Indonesian coffee exports, though it is limited to a single market: the United States. This study complements the previous analysis by using the Export Competitive Index (ECI) to analyze trends in changes in export market share, thereby determining whether the competitive advantages of Indonesia's coffee exports are accompanied by growth in market share in the global market.

This study aims to identifying and analyzing Indonesia's coffee export position by comparing its competitiveness with that of its main competitors and calculating the Ad-Valorem Equivalent (AVE) value of non-tariff barriers imposed by export destination countries. This study offers a novel approach by conducting a comparative analysis between Indonesia and its main competitors, namely Brazil, Vietnam, and Colombia, thereby enabling a more comprehensive assessment of Indonesia's competitive position in the global coffee export market.

Non-tariff Barriers

Trade liberalization, characterized by increased market access and reduced tariff barriers, has led to a rise in the use of non-tariff barriers in international trade. These measures serve as policy tools, particularly in developed countries, aimed at protecting consumers and domestic industries. One common form of non-tariff barrier is quotas, which are used to address a balance of payments deficit. The implementation of non-tariff barriers tends to drive up product prices; thus, while such policies benefit producers, they harm consumers and ultimately have a negative impact on overall economic well-being (Salvatore, 2014).

In the agricultural sector, non-tariff barriers play a key role in international trade. Several major challenges facing the export of Indonesian agricultural products relate to their still-low level of competitiveness, particularly in terms of quality assurance and the implementation of the Hazard Analysis and Critical Control Point (HACCP) system, supply reliability, distribution management, on-time delivery, cost efficiency, and product presentation. In addition, the requirement to meet product standards, such as compliance with international standards, including the ISO series covering ecolabeling and eco-efficiency, also presents a challenge. Overall, these various factors are classified as trade barriers under the WTO's global trade rules, falling under the categories of SPS and TBT.

A study conducted by Lidianti et al., (2024) used both qualitative and quantitative methods to examine the opportunities and risks of free trade between Indonesia and Malaysia in the coffee plantation sector. Research findings indicate that Indonesia faces intense competition

from countries that export high-quality commodities, one of which is Vietnam. Since the establishment of the ASEAN Free Trade Area (AFTA), ASEAN member states have agreed to reduce import tariffs to zero percent by 2015, leading many countries to shift toward implementing non-tariff barriers, including Malaysia. Malaysia's strategy to protect its industry involves creating and enforcing non-tariff barriers that could undermine Indonesia's trade interests. As a result, coffee exports have faced difficulties in expanding trade and have experienced a decline in competitiveness.

The Competitiveness of Coffee

The export competitiveness of a commodity refers to the ability of a commodity or product from a country to enter and maintain a presence in international markets and destination countries (Maulana & Kartiasih, 2017). This indicates that a country's commodities can be said to be competitive when they are able to enter and maintain their position amid the dynamics of the international market in general and the destination country's market in particular. The export competitiveness of commodities can be examined from two main perspectives namely comparative advantage and competitive advantage.

Previous research on coffee competitiveness analysis was conducted by Amanda & Rosiana (2023) using RCA, DRCA, and ISP. The results of the study indicate an RCA value of 5.3, meaning that Indonesian coffee is competitive but is still categorized as having low competitiveness, a status that has even declined in recent years due to low productivity and coffee quality, as the majority of the land consists of smallholder plantations that are still cultivated using traditional methods and rely on low-quality seeds. According to the DRCA analysis, the dynamics of Indonesia's coffee industry show a decline in competitiveness over time. Calculations of the ISP value indicate that Indonesia has a positive ISP index, indicating that Indonesia is a coffee-exporting country. A similar study was also conducted by Manalu et al., (2019), which found that Indonesia's coffee exports to the United States are classified as a "Rising Star," meaning that export performance is growing rapidly and dynamically; specifically, Indonesia's export growth rate continues to rise in tandem with the increasing share of Indonesian coffee exports to the United States. Nevertheless, this study indicates that Indonesia's coffee exports are still hampered by non-tariff policies, specifically the establishment of chemical residue limits.

METHODS

The type of data used in this study is secondary data consisting of time series data covering the years 2005 to 2024 and data cross section used is the destination countries for Indonesian coffee exports and the three main exporting countries (the United States, Belgium, Malaysia, Japan, and Egypt). The research data sources were obtained from the Central Statistics Agency, the Ministry of Agriculture, UN Comtrade, ITC-TradeMap, the International Coffee Organization (ICO), the Food and Agriculture Organization (FAO), and other relevant agencies. The coffee data used is based on the HS090111 nomenclature classification.

This study uses RCA, which was introduced in 1965 (Balassa, 1965) to analyze the comparative export competitiveness of a country. The RCA calculation refers to the value of coffee exports from the exporting country to the destination country (Xij), the total value of exports from the exporting country to the destination country (Xij), the value of world coffee exports to the destination country (Xkwj), and the total value of world coffee exports to the destination country (US$). i is the exporting country (Indonesia, Brazil, Vietnam, and Colombia) and j is the export destination country (United States, Belgium, Malaysia, Japan, and Egypt) as written in the following equation:

$$RCA = \frac{(X_{kij}/X_{ij})}{X_{kwj}/X_{wj}}$$

The RCA value has a range of values between 0 and ∞ (Gordeev, 2020). In general, the RCA value has two possibilities, namely RCA≥ 1 means that the exporting country's coffee has a strong comparative advantage in the international market, while 0 < RCA < 1 means that the exporting country's coffee has a weak

comparative advantage in the international market (Nurhayati *et al*., 2019).

The competitive advantage of Indonesian coffee and major exporting countries is analyzed using the Export Competitiveness Index (ECI) calculation. The ECI index shows the comparison of a country's export share of a particular commodity in a given period (t) with the export share of a particular commodity in a country in the previous period (t-1) (Harniati & Jamil, 2020).

If the ECI value of a commodity is greater than 1, it means that the commodity is facing an increasing competitiveness trend. Conversely, if the ECI value is less than 1, the commodity faces the possibility of a decline in market share or weakened competitiveness and is generally formulated as follows:

$$ECI = \frac{\left(\frac{X_{kij}}{X_{kwj}}\right)t}{\left(\frac{X_{kij}}{X_{kwj}}\right)t-1}$$

The EPD method can be used to analyze the competitive advantages and trade positions of Indonesian coffee exports and those of other major exporting countries. EPD also serves to identify the level of export dynamics, namely whether a country's coffee exports are experiencing rapid and sustained growth toward destination countries (Meliany *et al.*, 2021). In its calculations, EPD considers two main components: (1) export market share growth, which reflects the competitive strength of products (X-axis), and (2) total export share growth, which illustrates the attractiveness of international markets (Y-axis) (Meliany *et al*., 2021; Pratama *et al.*, 2020; Santoso *et al*., 2022)The mathematical equation for EPD can be seen in the following equation.

$$X - Axis = \frac{\sum_{t=1}^{T}\left(\left(\frac{X_{kij}}{X_{kwj}}\right)_t x\ 100\right) - \left(\left(\frac{X_{kij}}{X_{kwj}}\right)_{t-1} x\ 100\right)}{T}$$

$$Y - Axis = \frac{\sum_{t=1}^{T}\left(\left(\frac{X_{ij}}{X_{wj}}\right)_t x\ 100\right) - \left(\left(\frac{X_{ij}}{X_{wj}}\right)_{t-1} x\ 100\right)}{T}$$

The EPD calculation produces four categories of trade positions that can be mapped onto the four trade position quadrants in Figure 6, consisting of (1) quadrant I, namely the *rising star* position, indicating dynamic and competitive market share growth for products (*fast-growing products*); (2) quadrant II, which is the *lost opportunity* position, indicating a decline in the market share of previously competitive products, despite dynamic export growth; (3) quadrant III, which is the *retreat* position, indicating that the product's market share is no longer competitive and has stagnant growth; (4) Quadrant IV is the *falling star* position, indicating competitive market share, but stagnant export growth (Destiningsih *et al.*, 2020; Immanuel *et al.,* 2019).

The process of calculating the Ad Valorem Equivalent (AVE) value uses a trade equation that predicts trade flows. The equation used in this study refers to research conducted by (Kurniasih & Panennungi, 2021) and (Mao *et al*., 2023) which uses the following equation:

$$lnm_{nc} + \varepsilon_n In(1 + tar_{nc}) = \alpha_0 + \beta_1 SPS_{nc} + \beta_2 TBT_{nc} + \sum_k a_{nk} C_c^k + \delta_3 GDP_{nc} + Y_4 D_{nc} + \theta_5 NTR_{nc} + U_{1t}$$

Where

$$\sum_k \alpha_{nk} C_c^k = \alpha_1 AgricultureLand_{nc}/GDP_{nc} + \alpha_2 Labor_{nc}/GDP_{nc} + \alpha_3 Capital_{nc}/GDP_{nc}$$

Description:

m_{nc} : Value of coffee imports in the destination country (US$)
SPS_{nc} : Variable *dummy* SPS
TBT_{nc} : Variable *dummy* TBT
GDP_{nc} : Real GDP of the destination country in t (US$)
D_{nc} : Economic distance between exporting countries and destination countries (Km)
NTR_{nc} : Real exchange rate of the exporting country against the currency of the destination country in t (US$/LCU)
C : Characteristics that define the destination country

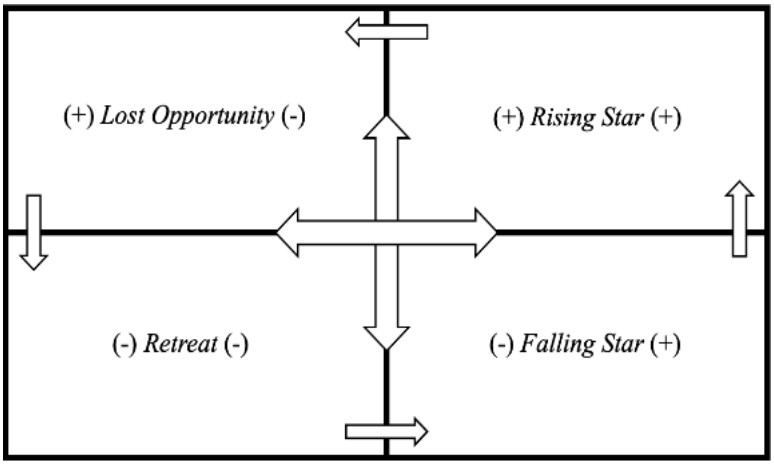


Figure 1. Matrix EPD (Esterhuizen, 2006)

The next step to obtain the AVE value from SPS and TBT is to change the SPS coefficient (β_1) and TBT (β_2) using the equation formulated by Kee *et al.*, (2009) by using the elasticity of import demand and using $dprice_{nc}$ (domestic price for coffee).

$$\frac{\delta lnm_{nc}}{\delta lnSPS_{nc}} = \frac{\delta lnm_{nc}}{\delta lndprice_{nc}} \frac{\delta lndprice_{nc}}{\delta lnSPS_{nc}} = \varepsilon_{nc} AVESPS_{nc}$$

$$\frac{\delta lnm_{nc}}{\delta lnTBT_{nc}} = \frac{\delta lnm_{nc}}{\delta lndprice_{nc}} \frac{\delta lndprice_{n}}{\delta lnTBT_{nc}} = \varepsilon_{nc} AVETBT_{nc}$$

$$AVESPS_{nc} = \frac{1}{\varepsilon_{nc}} \frac{\delta lnm_{nc}}{\delta lnSPS_{nc}} = \frac{(e^{\beta_{nc}^{SPS}}) - 1}{\varepsilon_{nc}}$$

$$AVETBT_{nc} = \frac{1}{\varepsilon_{nc}} \frac{\delta lnm_{nc}}{\delta lnTBT_{nc}} = \frac{(e^{\beta_{nc}^{TBT}}) - 1}{\varepsilon_{nc}}$$

Where

β_{nc}^{SPS} : 1 - e^{β_1}

β_{nc}^{TBT} : 1 - e^{β_2}

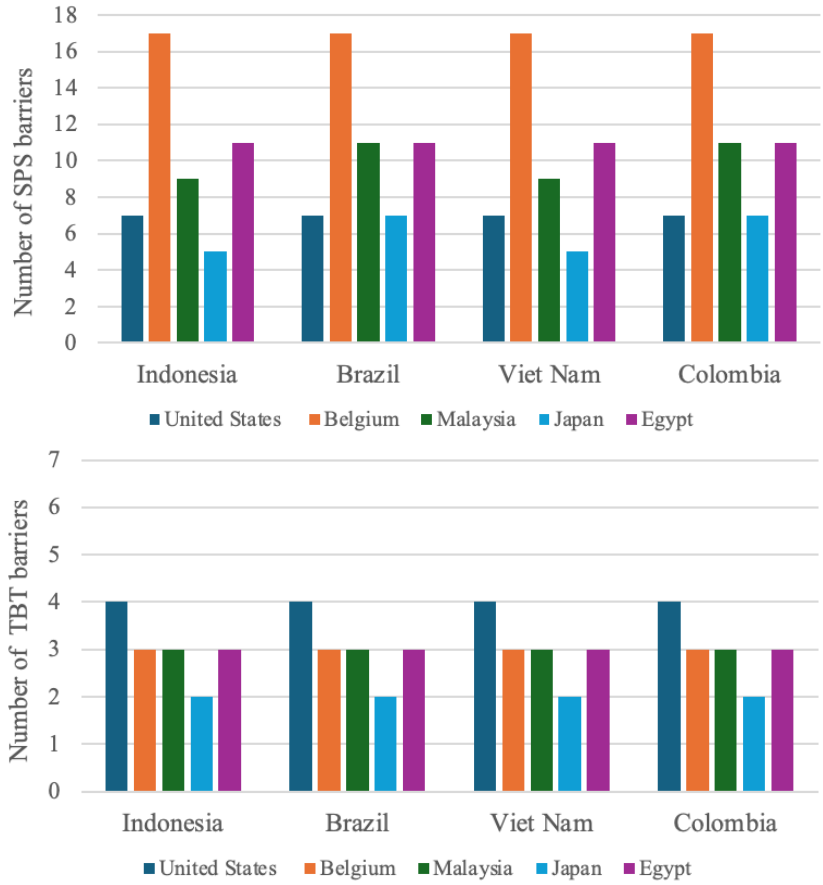
RESULTS AND DISCUSSION

Identification of the Implementation of Non-Tariff Barriers

The most commonly applied non-tariff barriers in the form of technical regulations, which have been extensively studied in empirical research, include sanitary and phytosanitary barriers as well as technical barriers to trade (Hwang & Lim, 2017; Wood et al., 2019). According to the WTO, the application of provisions related to SPS and TBT is still permitted because their primary purpose is to protect human and animal health and to enhance the effectiveness and safety of technical regulations (Ghodsi, 2018).

Incidents involving SPS barriers occur far more frequently than TBT incidents in Indonesian coffee exports to the five major destination countries: the United States, Belgium, Malaysia, Japan, and Egypt. In Belgium, there were 17 SPS incidents recorded for the four countries, while TBT incidents from all partners remained relatively constant, at around 2 to 4 regulations per country. This indicates that SPS regulations pose a greater obstacle to coffee exports than technical regulations. Meanwhile, according to UNCTAD (2023), TBT barriers account for 70% of global trade. However, this study found that SPS barriers account for the largest share, 80% of total non-tariff barriers applied to coffee exports. Similar findings were also reported in the study by Wickrama et al., (2024), which showed that SPS barriers are frequently applied to agricultural exports.

SPS barriers are frequently applied to coffee exports because, as an agricultural food commodity, coffee is vulnerable to health risks and contaminants that affect product quality; consequently, importing countries tend to establish strict SPS standards to protect consumer health and the integrity of their domestic agricultural systems. and recent literature indicates that changes in SPS measures in destination countries can affect the flow of coffee exports in the global market, suggesting that SPS is not only a health protection instrument but also a key determinant of market access for agricultural commodities such as coffee in OECD countries and other developing nations (Assoua et al., 2024).



(source: data processed from UNCTAD TRAINS 2025)

Figure 2. Distribution of non-tariff barriers on coffee exports from Indonesia and the three exporting countries

Regulations on product labeling are the most significant non-tariff barriers imposed by importing countries on coffee exports from Indonesia and the three major coffee-exporting countries, both under the SPS (A31) and TBT (B31) categories (UNCTAD TRAINS, 2025). The five destination countries namely Indonesia, Brazil, Vietnam, and Colombia, that require product labeling for coffee exports indicate that labeling standards are now one of the key prerequisites that exporters must meet. In the modern era, consumers are becoming increasingly discerning and want to know all the details about the food products they consume, making transparency a key factor in their purchasing decisions and behavior (Marchini et al., 2021).

In addition to provisions related to product labeling, provisions regarding special authorizations (A14), packaging (A33), health certification (A83), and mandatory inspections (A84) are also the second most frequently applied SPS incident codes. The implementation of SPS regulations under these codes is necessary because they serve as the primary instruments for ensuring food safety, protecting consumer health, and enhancing product credibility in international markets. This standard also encourages exporting countries to strengthen their domestic capacity through testing laboratories, quality control systems, and globally recognized certification. Although the implementation of SPS measures may increase compliance costs and potentially reduce export volumes in the short term, in the long term these measures actually expand market access, reduce the risk of product rejection, and align with global trends in which consumers are increasingly demanding transparency and food safety.

Evaluation of Indonesia's Market Position and Competitiveness with Major Coffee Exporting Countries

The high demand for coffee in the global market, where it is used as a major consumer commodity and raw material for the beverage industry, makes this commodity one of the most strategic agricultural products in the world. Developed countries such as the United States, Japan, and Belgium are the main consumers, with demand continuing to increase every year, in line with changes in lifestyle and the growth of the modern café industry. This situation requires coffee-producing countries to be highly competitive to maintain their market share amid fierce global competition. Indonesia, as one of the world's coffee producers and exporters, along with Brazil, Colombia, and Vietnam, has great potential to strengthen its position.

The RCA index calculation results can be used to identify a positive relationship between a country's coffee export share and its comparative competitive advantage or disadvantage in the international market (Amanda & Rosiana, 2023).

Table 1 shows that Indonesia's RCA value indicates good competitiveness, but not as high as Brazil, Vietnam, and Colombia. Indonesia's ECI is relatively stable, but there has been a decline in the Japanese market. These results are also supported by Indonesia's EPD, which shows variations in position, including Rising Star in the United States and Malaysia, but Lost Opportunity in Belgium, Retreat in Japan, and Falling Star in Egypt, indicating inconsistent performance in various markets.

Brazil has a stronger and more stable competitive advantage than Indonesia. Brazil's RCA is much higher in almost all markets, especially in Belgium, Japan, and Malaysia. Brazil's EPD is more consistent in the Rising Star category, while Indonesia has a combination of Rising Star and declining positions. Indonesia's RCA value is superior in the Egyptian market at 36.27 compared to Brazil's 3.58, but its market position remains Falling Star, indicating a decline in performance despite relatively strong competitiveness.

Vietnam's competitiveness is superior in terms of market strength and growth dynamics. Vietnam's RCA is higher for almost all export destinations. This shows that Indonesia's competitiveness is below that of Vietnam as fellow ASEAN countries.

Table 1. Results of RCA, ECI, and EPD calculations for Indonesia and major coffee exporting countries in destination countries for the period 2005-2024

Import /Export	Indonesia			Brazil		
	RCA	**ECI**	**EPD**	**RCA**	**ECI**	**EPD**
United State	7.46	1.02	Rising Star	19.82	1.04	Lost Opportunity
Belgium	13.94	1.35	Lost Opportunity	58.70	1.09	Rising Star
Malaysia	6.56	1.03	Rising Star	9.03	1.16	Rising Star
Japan	2.41	0.99	Retreat	38.36	1.04	Rising Star
Egypt	36.27	19.91	Falling Star	3.58	1.01	Retreat
Import /Export	**Vietnam**			**Colombia**		
	RCA	**ECI**	**EPD**	**RCA**	**ECI**	**EPD**
United State	6.18	1.03	Rising Star	39.98	1.01	Lost Opportunity
Belgium	40.74	1.10	Falling Star	177.29	1.05	Rising Star
Malaysia	17.52	1.07	Rising Star	183.27	1.49	Rising Star
Japan	5.89	1.13	Rising Star	299.95	0.97	Falling Star
Egypt	72.25	1.43	Rising Star	144.97	1.08	Falling Star

Source: processed data (2025)

Colombia's RCA is very high compared to Indonesia and the highest among all countries, confirming Colombia's dominance as a major coffee exporter. Colombia's EPD varies just as much as Indonesia's. Compared to Indonesia, Colombia is superior in basic competitiveness (RCA) but not always superior in market growth (EPD).

Indonesian coffee exports show significant performance disparities. Indonesia has been able to become a Rising Star in the large markets of the United States and Malaysia, but at the same time faces the daunting challenge of becoming a Retreat in the Japanese market. In addition, Indonesia has also experienced Lost Opportunity in Belgium and Falling Star in the Egyptian market. This emphasizes the need for an adaptive export strategy that focuses on improving quality and efficiency in order to gain competitiveness in dynamic markets. One of the causes of the *Lost Opportunity* condition is the increasing number of competing countries, such as Vietnam, which has successfully taken the top spot as the main producer and exporter of robusta coffee, replacing Indonesia's position.

Vietnam and Colombia demonstrate high competitiveness in almost all coffee export markets due to a combination of superior product quality, market diversification, and strong institutional support. Vietnam's success is due to several factors, including mass migration, land, government policy, crop selection, technology, and the coffee price boom. (Manalu *et al*., 2019). Quality-based differentiation and origin branding play a central role in sustaining Colombia's competitive advantage and market presence in North America, Europe, and Asia (Ferguson, 2017).

In line with these conditions, Indonesia's RCA value fluctuated and remained low in export destination countries during the 2005-2024 period (Figure 2). The index value results are in line with Indonesia's coffee export value and volume, which have been unstable and tend to decline.

In general, Indonesia's coffee RCA is above 1, indicating a comparative advantage in the international market, but its value is unstable due to changes in world coffee prices, the rupiah exchange rate, plantation productivity, and competition from other producing countries such as Brazil, Vietnam, and Colombia. Meanwhile, the RSCA value also shows an upward and downward pattern, reflecting dynamic and inconsistent export competitiveness.

These variations can be attributed to a combination of internal factors, notably changes in production quality and output levels, and external factors, including fluctuations in global demand and the implementation of trade policies, shich jointly influence export performance (Paramita & Fitrianto, 2024). These findings are consistent with the findings of Sulistiyo *et al*., (2023), which shows that Indonesia's comparative advantage in the global coffee market fluctuates and is relatively low compared to other major coffee exporting countries.

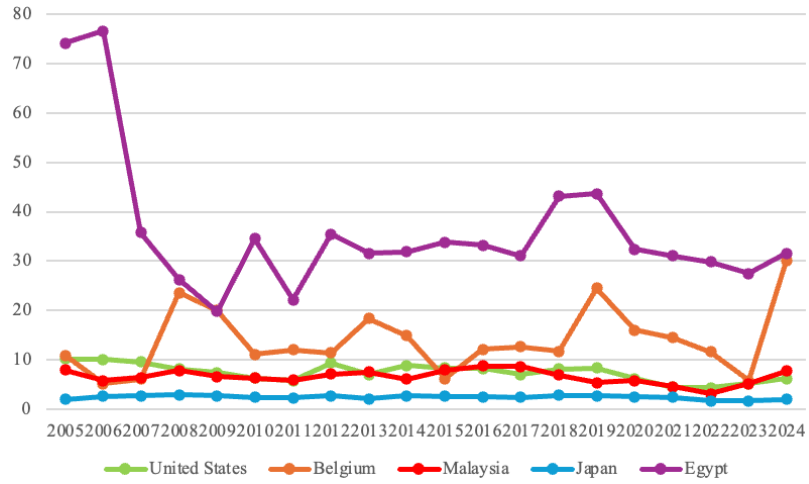


Figure 3. Indonesia's RCA index value in destination markets from 2005 to 2024 (processed from UN Comtrade 2025)

One factor contributing to the low quality of Indonesian coffee exports is that around 90% of the product shipped overseas is still in the form of green coffee. Most coffee farmers in Indonesia are small-scale farmers with limited skills, so many of them harvest coffee beans before they reach optimal maturity. In addition, the moisture content of coffee beans often does not meet the recommended standard of 12.5%, resulting in mold growth and broken beans due to the use of inadequate peeling equipment. These conditions have an impact on the decline in the selling value of Indonesian coffee in the international market (Sulistiyo *et al*., 2023).

Other problems faced by downstream industry players include limited supporting facilities and infrastructure, as well as various regulatory barriers, particularly in the areas of labor, taxation, and trade. In addition, low entrepreneurial motivation, limited access to capital, and limited mastery of processing and packaging technology are also major obstacles. On the other hand, the quality of human resources in the marketing of downstream products is also not yet optimal (Paramita & Fitrianto, 2024).

The high value of *Revealed Comparative Advantage* (RCA) of coffee in these three countries is influenced by various factors, including: (1) coffee export value and total exports that are significantly greater than Indonesia's, (2) coffee productivity levels that exceed Indonesia's coffee productivity, (3) government policies oriented towards increasing productivity and coffee quality, (4) support in the form of capital provision, credit facilities, training and extension related to coffee cultivation knowledge, and optimal use of technology, and (5) the existence of specialized institutions that play a role in the development of the coffee sector, ranging from the expansion of harvest areas, technical research, quality control, to marketing aspects, such as the *Federación Nacional de Cafeteros* (FEDECAFE) in Colombia (Sulistiyo *et al*., 2023).

Fadilah *et al*., (2024) adds that the decline in the value competitiveness of Indonesia's coffee exports is influenced by several external factors, including global coffee oversupply, international economic downturns, weakening coffee demand in major consumer markets such as the United States and Europe, armed conflicts that disrupt the secutiry if coffee production and export activities, and increasing climate variability that creates uncertainty in production and supply chains. This is also supported by research of Manalu *et al.*, (2022), heightened competition in global trade, as captured by volatility in export values and changes in comparative and competitive advantage indicators, has exerted a negative effect on Indonesia's export value.

Ad Valorem Equivalent Value of Non-Tariff Barriers to Indonesian Coffee Exports

In an era of increasingly intensive trade liberalization, non-tariff barriers such as SPS and TBT have become a prominent form of protection compared to conventional tariffs. To measure and quantify the impact of these invisible trade barriers, the concept of Ad Valorem Equivalent (AVE) has become an essential analytical tool. AVE is defined as a hypothetical (implicit) import tariff that is equivalent to or would have the same impact on imports of a product as that caused by the applicable non-tariff barriers.

AVE converts compliance costs (certification, testing, product modification, and administrative delays) incurred by exporters to meet SPS and TBT requirements. Through AVE estimates, it is possible to present the amount of non-tariff barriers that have been equated with tariffs on Indonesian coffee exports. The AVE value is estimated using a model and then calculated using an equation with domestic demand and price elasticity. The results of the AVE value estimation are shown in Table 2.

Table 2 shows variations in AVE values for SPS and TBT barriers, reflecting the structural challenges and economic potential faced by Indonesia in coffee trade. Based on Kurniasih & Panennungi (2021), AVE describes the magnitude of compliance costs that exporters must bear as a result of SPS or TBT regulations in the destination country. The higher the AVE, the higher the non-tariff barriers experienced by Indonesian coffee exporters.

Table 2. Ad Valorem Equivalent (AVE) values of non-tariff barriers to Indonesian coffee exports

Importing Country	AVE SPS (%)	AVE TBT (%)
United States	28.71	42.96
Belgium	94.95	4.31
Malaysia	39.71	67.38
Japan	73.01	17.46
Egypt	21.64	33.07

Source: processed data (2025)

Based on the AVE calculation results, it appears that each destination country applies different levels of SPS and TBT barriers to Indonesian coffee exports. These differences are in line with the findings of Kurniasih & Panennungi (2021) that each importing country has regulatory characteristics that produce asymmetric impacts on exporters, especially developing countries such as Indonesia, so that the resulting compliance costs also vary.

For the United States, an AVE SPS of 28.71% and a TBT of 42.96% indicate that the greatest barriers stem from technical regulations. This is consistent with the approach of Kee *et al*., (2009) Technical regulations often result in higher price distortions because they cover labeling, content, and traceability requirements. Thus, the US market imposes a significant implicit tax, particularly through TBT.

In Belgium, AVE SPS reached 94.95%, much higher than TBT, which was only 4.31%. According to the pattern described by Kee *et al*., (2009) and also confirmed in the analysis of Mao *et al*., (2023), Developed countries with strict food safety standards tend to produce high AVE SPS. A value of nearly 95% indicates that EU food safety regulations (such as aflatoxins, pesticide residues, and traceability requirements) create a significant compliance burden for Indonesian exporters, which is greater than the technical distortion.

Meanwhile, Malaysia shows a different pattern, with AVE TBT reaching 67.38% and becoming the most dominant barrier. Malaysia's TBT regulations include labeling requirements, Halal requirements, and other technical standards. This high TBT value is in line with the findings of Kurniasih & Panennungi, (2021) that middle-income countries can still incur high compliance costs due to technical regulations that are not fully harmonized with international standards. Malaysia's SPS value (39.71%) is also quite high, although not as high as TBT, reflecting strict food safety controls, albeit not as high as in developed countries.

In the Japanese market, high SPS values (73.01%) and relatively low TBT values (17.46%) reflect the characteristics of developed countries that set strict food safety standards and very low residue tolerances. The high SPS value indicates that countries with very strict health standards produce large SPS AVEs, thereby creating a significant *implicit tariff* for Indonesian coffee exports (Kee *et al*., 2009; Mao *et al*., 2023).

Finally, in Egypt, the AVE SPS of 21.64% and TBT of 33.07% indicate that technical barriers are still greater than SPS standards. According to the explanation of Kurniasih & Panennungi, (2021), Countries with moderate or low regulatory capacity tend to incur additional compliance costs due to inefficient inspection, standardization, and certification processes. Therefore, Egypt's TBT value is relatively high even though it is not a developed country.

CONCLUSION

The analysis results indicate that the competitiveness of Indonesia's coffee exports remains below that of major exporting countries such as Brazil, Vietnam, and Colombia. This is evidenced by Indonesia's relatively lower RCA values for most export destination countries and its unstable EPD position. This low competitiveness is influenced by suboptimal coffee quality and productivity, the dominance of green coffee exports, limited post-harvest technology, and weak institutional support. In addition, the AVE estimates indicate that non-tariff barriers in the form of SPS and TBT remain major challenges for Indonesian coffee exports. The high SPS AVE values in Belgium and Japan indicate the significant costs of compliance with food safety

standards, while the high TBT AVE values in Malaysia and the United States indicate that technical regulations such as labeling, certification, and other technical standards remain barriers for Indonesian coffee exporters.

The government needs to strengthen efforts to improve the quality and productivity of domestic coffee by enhancing cultivation, harvesting, and post-harvest practices so that it can meet SPS and TBT standards in international markets. Support in the form of technology, financing, training, and institutional strengthening for the domestic coffee sector also needs to be enhanced to support standardization and certification. In addition, efforts to harmonize standards and improve compliance with export regulations should be prioritized, particularly for destination countries with the highest AVE values, so that Indonesia can reduce the burden of non-tariff barriers and sustainably enhance the competitiveness of its coffee exports.

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