

REVEALING THE POTENTIAL OF INDONESIAN COFFEE: ANALYSIS OF COMPETITIVENESS IN THE INTERNATIONAL MARKET

Ni Made Ayu Vionita Dewi^{1*}, Ketut Budi Susrusa¹, Gede Mekse Korri Arisena¹, Suryani Nurfadillah² and Kadhung Prayoga²

¹Department of Agribusiness, Faculty of Agriculture, Universitas Udayana, Denpasar, Bali

²Department of Agribusiness, Faculty of Animal and Agriculture Sciences, Universitas Diponegoro, Semarang, Central Java

*Correspondence Email: vionitadewi02@gmail.com

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ABSTRACT

This research aims to analyze the competitiveness, and the factors influencing competitiveness, and to determine the position of Indonesian coffee exports in the international market in 2001-2022. The coffee product analyzed used HS code 0901. This research employed three calculation methods: Revealed Comparative Advantage (RCA) to measure comparative advantage, the Error Correction Model (ECM) to identify the factors affecting competitiveness, and the Trade Specialization Index (TSI) to determine the position of Indonesian coffee exports. The RCA value of this study indicated that coffee commodities have a comparative advantage with a value >1 . The Trade Specialization Index (TSI) value showed that Indonesian coffee commodities are in the maturation stage, with a value of $0.9 < TSI \leq 1$. The ECM analysis indicated that competitiveness factors, export value, export volume, and GDP impact the competitiveness of Indonesian coffee in the international market. The results showed that the comparative advantage of Indonesian coffee from 2001 to 2022 had very strong competitiveness with a value of 3.69. Factors that significantly affect the competitiveness of Indonesian coffee in the long and short term are export value, export volume, and GDP at a real level of 5%. The Trade Specialization Index (TSI) is in the export maturation stage or rendering a net exporter country with a value of 0.91.

Keywords: *coffee, competitiveness, RCA, ECM, ISP*

BACKGROUND

The main commodity with the highest export value for Indonesia is coffee. Coffee is an agricultural product with market opportunities both domestically and internationally (Sulistiyo et al., 2023). According to Table 1 data on global coffee 2018-2022, Brazil ranks first, Vietnam is second, and Colombia and Germany occupy the next positions. Indonesia ranks sixth, exporting 437,947 tons of coffee in 2022 (Trade Map, 2023). The opening up of the global market and global coffee oversupply indicates an increase in competition for the global coffee market (Jamil, 2019). Indonesia has significant opportunities to enhance its position in the global coffee market by addressing various challenges that hinder the maximization of its coffee productivity.

Table 1. List exporters of coffee

Exporters	Year				
	2018	2019	2020	2021	2022
Brazil	1.828.867	2.216.537	2.379.069	2.288.336	2.135.446
Viet Nam	874.114	1.421.866	1.241.229	1.199.632	659.465
Colombia	722.541	769.050	706.242	700.643	642.674
Germany	588.991	592.738	586.689	600.512	575.400
Indonesia	280.157	359.053	379.354	387.264	437.947

Source: Trade Map, 2023

The huge trade potential of Indonesian coffee is faced with various challenges, such as limited post-harvest technology and the dominance of unprocessed coffee bean exports (Jamil, 2019). To address these challenges, enhancing the competitiveness of Indonesian coffee is critical. Factors such as quality improvement, pricing strategies, and branding play an essential role in consumer purchasing decisions, particularly in international markets where specialty coffee demand is growing (Wati, 2020). Moreover, certifications like fair trade and labeling have increasingly influenced consumer preferences, allowing Indonesia to reposition its coffee products as premium offerings on the global stage.

Indonesia has a great opportunity to increase coffee exports through the development of specialty coffee, which is known for its unique taste and characteristics. Specialty coffee is coffee that is traceable in origin, processed to a high standard, and meets a specific flavor profile (Urwin et al., 2019). The application of technologies such as blockchain further strengthens the competitiveness of these coffees, allowing consumers to find out detailed information about the origin, process, and quality of the product, including halal, organic, and allergen-free certifications (Alamsyah et al., 2023). The development of specialty coffee in Indonesia provides a strategic opportunity to increase competitiveness in the global coffee market. Focus on quality, sustainability, and innovation in specialty coffee can create significant added value compared to regular commodity coffee. Research shows that consumers are increasingly seeking transparency in product origins, which can be achieved through technologies such as blockchain. This technology not only increases consumer confidence but also enables better traceability in the coffee supply chain (Liu et al., 2019; Maspul, 2024).

Indonesia has a great opportunity to capitalize on its comparative advantage through coffee products. By utilizing abundant natural resources, diverse coffee varieties, and innovative technology, Indonesia can strengthen its competitiveness and increase its market share in the global coffee sector. Quoted by Ricardo (2015) the theory of comparative advantage is an important foundation in understanding competitiveness in international trade. In his famous book, "On the Principle of Political Economy and Taxation" published in 1817, Ricardo explained that countries will benefit from international trade if each country specializes in the production of goods that they can produce at relatively lower costs compared to other countries. Competitiveness is a major element in the success of coffee products in the international market. Countries such as Colombia and Vietnam have successfully utilized technology and branding strategies to maintain their dominance in the coffee market (Perez & Viana, 2012).

Indonesia has great potential to compete by implementing similar strategies, including improved product quality through better post-harvest practices and the application of technology in the supply chain (Fitri et al., 2023). To better understand Indonesia's position in the global coffee market, this study analyses Indonesia's coffee competitiveness using the Revealed Comparative Advantage (RCA), Error Correction Model (ECM), and Trade Specialization Index methods. These methods provide a comprehensive perspective on the competitive position of Indonesian coffee by examining factors such as export value, GDP per capita, exchange rate fluctuations, and export volume. The RCA method assesses Indonesia's comparative advantage relative to other major coffee exporting countries, while the ECM explores the long-run and short-run relationships between macroeconomic variables and coffee exports. The Trade Specialization Index further evaluates Indonesia's development from an importer-inclined to an exporter-inclined country.

RESEARCH METHODS

The data used in this research was secondary data consisting of time series from 2001 to 2022. The research focused on the coffee commodity with HS code 0901, which consisted of roasted coffee, decaffeinated coffee or not, coffee husks, and coffee substitutes containing any proportion of coffee. The data were obtained from several sources: the Central Statistics Agency of Indonesia, United Nations Commodity Trade (UN Comtrade), International Trade Center (ITC), International Coffee Organization (ICO), the Ministry of Agriculture of the Republic of Indonesia, and Ministry of Trade of the Republic of Indonesia, accessed through the official websites of the respective institutions. Furthermore, the data was analyzed using Revealed Comparative Advantage (RCA), Error Correction Model (ECM), and Trade Specialization Index (TSI).

According to Balassa (1965), RCA analysis can determine whether a product has a competitive advantage. If the RCA value is higher, it indicates greater competitiveness, and vice versa. The boundaries for competitiveness values are:

$RCA > 1$ = High Competitiveness

$RCA < 1$ = Low Competitiveness

The formula for RCA is:

$$RCA = \frac{\frac{X_{ij}}{X_{.j}}}{\frac{X_{iw}}{X_{.w}}}$$

Information:

X_{ij} = Export Value of Indonesian Coffee Commodities to International Markets (US\$)

$X_{.j}$ = The total export value of Indonesian coffee to international markets (US\$)

X_{iw} = The export value of coffee commodities from the world to international markets (US\$)

$X_{.w}$ = The total export value of all commodities from the world to international markets (US\$)

ECM was first introduced by Sargan later developed by Hendry, and subsequently popularized by Engle and Granger (Anwar, 2019). According to Engle & Granger (1987), the error correction model is a technique for correcting short-term imbalances toward long-term equilibrium and can explain the relationship between dependent and independent variables at present and in the

past. ECM is applied in the econometric analysis of time series data due to its ability to encompass multiple variables to analyze long-term economic phenomena and assess the consistency of empirical models with econometric theory, as well as to address issues with non-stationary time series variables and regression lags in econometric analysis.

The equation formula used is as follows:

$$\Delta RCAKI_t = \beta_0 + \beta_1 NEXKI_t + \beta_2 GDPI_t + \beta_3 ERA_t + \beta_4 VEXKI_t + Z_{t-1}$$

Information:

$RCAKI_t$ = Competitiveness of Indonesian Coffee from 2001 to 2022

$NEXKI_t$ = Export value of Indonesian coffee from 2001 to 2022 (US\$)

$GDPI_t$ = GDP per capita of Indonesia from 2001 to 2022 (US\$)

ERA_t = Exchange rate of the Indonesian rupiah to the US dollar from 2001 to 2022 (US\$)

$VEXKI_t$ = Export volume of Indonesian coffee from 2001 to 2022 (ton)

Z_{t-1} = Error Correction Term (ECT)

TSI is used to gain an understanding of the prospects of commodities that currently have comparative advantage. It also assists in identifying or predicting whether a commodity exhibits a particular cyclical pattern and determining its stage of performance.

The formula used is:

$$TSI = \frac{Xit - Mit}{Xit + Mit}$$

Information:

TSI = Trade Specialization Index of Indonesia from 2001 to 2022

Xit = Export value of Indonesian coffee from 2001 to 2022 (US\$)

Mit = Import value of Indonesian coffee from 2001 to 2022 (US\$)

RESULT AND DISCUSSION

Competitiveness considers factors such as efficiency, labor costs, national policies, and trade efficiency, which affect international trade by optimizing competition among exporting countries (Ginting, 2023; Lestari et al., 2023). RCA measures a country's comparative advantage based on its exports relative to world exports. Based on **Figure 1** shows that the value of RCA coffee Indonesia is more than one, indicating that the product/commodity has competitiveness. Indonesian coffee exhibits strong competitiveness with an average RCA value of 3.7, reaching its highest value of 5.3 in 2008 and its lowest value of 2.1 in 2022.

The highest value of RCA (Revealed Comparative Advantage) in 2008 reflects a period when Indonesian coffee exports benefited from high global coffee prices, driven by increased demand for specialty coffee and reduced production in competitor countries due to adverse weather conditions. Unfavorable weather conditions in competitor countries such as Brazil and Vietnam contributed to the increase in global coffee prices, which gave Indonesian coffee producers an advantage (Kabeta & Dangia, 2022).

In 2022, the RCA value reached its lowest point due to various factors. The lingering effects of the COVID-19 pandemic disrupted global trade and logistics, leading to increased export costs and reduced accessibility to international markets (Nchanji et al., 2021). Research indicates that the pandemic disrupted supply chains and access to agricultural services, adversely affecting coffee production in several countries, including Indonesia. Moreover, Indonesia is facing growing competition from countries like Vietnam and Brazil, which are adopting aggressive export strategies and advancing technologically in coffee production (Perez & Viana, 2012). Domestically, weather anomalies and decreased investment in coffee plantations lead to variable yields, while increasing production costs pressure producers' profitability (Wulandari, 2021).

The decline in RCA in 2011 was due to a reduction in export volume caused by extreme weather changes that decreased coffee productivity. Although Indonesian coffee exports demonstrate a comparative advantage, its contribution remains low, only 2%-4% of global coffee exports. To compete with other major exporters, it can be concluded that while Indonesian coffee has a comparative advantage, this advantage still needs to be enhanced to compete effectively with the world's leading coffee-exporting countries.

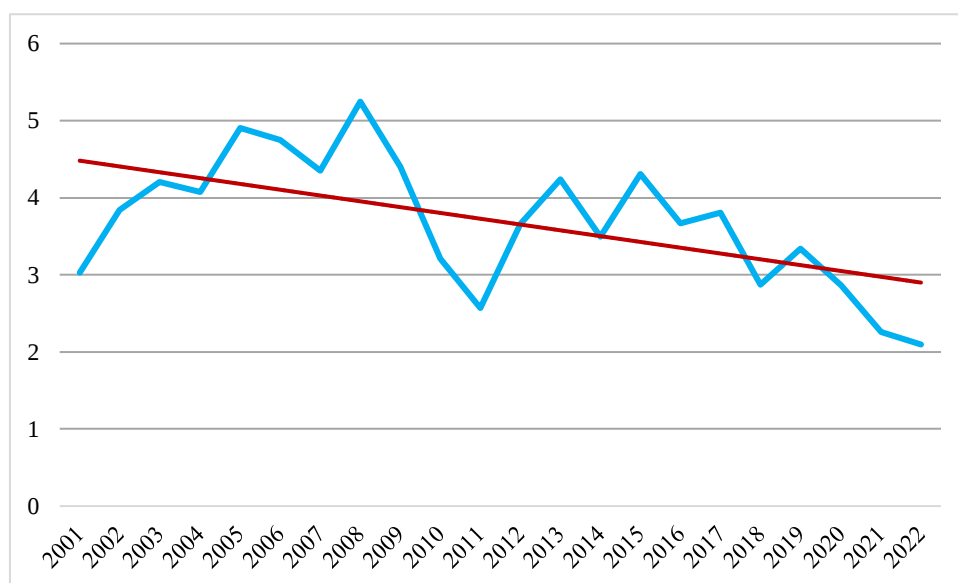


Figure 1. RCA Value of Indonesian Coffee Commodities from 2001 to 2022.

ECM estimation of factors affecting the competitiveness of Indonesian coffee in the international market is used to see the long-term and short-term relationship between competitiveness and export value, real GDP per capita, the rupiah exchange rate against the United States currency (Dollar), and coffee export volume. In **Table 2** result of long-term, it can be seen statistically that the R^2 value of 0.84 indicates that the diversity of Indonesian coffee competitiveness can be explained by its independent variables by 84 percent and the rest is explained by other factors outside the model. In the long term, three variables have a significant effect on Indonesian coffee competitiveness, namely the value of Indonesian coffee exports, Indonesian GDP per capita, and the volume of Indonesian coffee exports.

Table 2. Long-Term and Short-Term Regression Results

Long-term Model			ECM Model (Short-Term)		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
NEXKI	0.002095	0.0034	D(NEXKI)	0.001589	0.0013
GDPI	-1.080812	0.0000	D(GDPI)	-1.637346	0.0001
ERA	0.070508	0.2532	D(ERA)	-0.104531	0.3545
VEXKI	0.004542	0.0063	D(VEXKI)	0.004012	0.0000
			ECT (-1)	-0.551014	0.0093
C	2426.108	0.0013	C	201.4391	0.0443
R^2	0.844327		R^2	0.918405	
F_h	23.05089		F_h	33.76680	
DW	1.086380		DW	1.676936	

Based on **Table 2** result of ECM (short-term), R^2 value is 0.91. This indicates that 91% of the diversity of factors that affect the competitiveness of Indonesian coffee can be explained by the model, while 9% is explained by other variables outside the model. The variables that significantly affect the competitiveness in the short and long-term regression of Indonesian coffee are the value of Indonesian coffee exports, Indonesia's real GDP per capita, and the volume of Indonesian coffee exports. Meanwhile, the rupiah exchange rate against the United States currency (dollar) does not affect the competitiveness of Indonesian coffee.

Export value has a positive influence on RCA, meaning that when the export value increases, the RCA (competitiveness) of coffee will increase. An increase in export prices by US\$ 1 will increase the volume of coffee exports by 8,070.106 tons and vice versa. According to Amarullah (2021) When exports increase, domestic products will have competitive quality and prices in the international market. This can encourage sustainable economic growth and increase competitiveness. Research by Utami et al. (2018) indicates that when global coffee prices rise, the volume of coffee exports also increases. For example, an increase in export prices by \$1 will increase the volume of coffee exports by 8,070.106 tons, and vice versa.

GDP harms the competitiveness of Indonesian coffee. It means that an increase in GDP can lead to a decrease in competitiveness. This occurs when foreign exchange earned from exports is used to pay off foreign debt rather than enhancing national income. In the short term, foreign debt boosts foreign exchange reserves and GDP. However, in the long term, it can reduce national budgets and lower competitiveness. According to research conducted by Sitanini et al. (2020) imports of both oil and gas and non-oil and gas products increase GDP in the long term because many raw materials and goods/services are imported to meet domestic needs. However, high import dependency can reduce competitiveness, as domestic industries become less competitive and more vulnerable to fluctuations in the international market. Hence, despite an increase in GDP, global competitiveness may decline.

Export volume has a positive effect on RCA (competitiveness), meaning that when export volume increases competitiveness will increase. An increase in export volume is closely related to price, as with the law of supply. Thus, maintaining stable and competitive export prices is essential to ensure a sustainable increase in export volumes and strengthen the country's economic competitiveness in the global market. According to Kiptiah (2022) the law of supply if the price of a

commodity rises, the goods offered will increase, if the price of a commodity falls, the goods to be offered will also decrease, and this will have an impact on the volume of exports.

The exchange rate of the Indonesian rupiah against the US dollar does not significantly affect the competitiveness of Indonesian coffee. The exchange rate or currency value does not always affect competitiveness due to the presence of other more dominant factors and the complex relationship between exchange rates and competitiveness. According to Silihotanga et al. (2017) exchange rate volatility, which reflects the fluctuations of a country's currency relative to other currencies, can impact international trade. High exchange rate volatility can increase uncertainty and transaction costs, potentially reducing export and import competitiveness. However, if exchange rate volatility can be managed or minimized, it can promote efficiency, productivity, and international welfare.

Based on **Figure 2**, Indonesia has a positive TSI index which illustrates that Indonesia is a coffee exporting country. This is evidenced by the TSI of Indonesian coffee from 2001 to 2022 which has a positive value, namely between 0 and 1. Indonesia has a fluctuating index every year in the period 2001 to 2022. TSI analysis can also explain the stages or trade cycles of Indonesian coffee. Based on ISP calculations, Indonesia from 2001 to 2006 was in the maturation stage. The maturation stage of the trade specialization index reflects the peak of a country's competitiveness in the export of a particular product, characterized by international market dominance and stable export values at optimal levels.

In 2007, this period showed that Indonesian coffee was in a growth stage in world trade or had low competitiveness, but by 2008, the trade specialization index indicated a shift toward maturity, as the export value peaked due to favorable market conditions. However, subsequent years marked a decline in the index, suggesting a regression from maturity back to the growth stage, driven by increasing competition, fluctuating production, and challenges in sustaining export dominance.

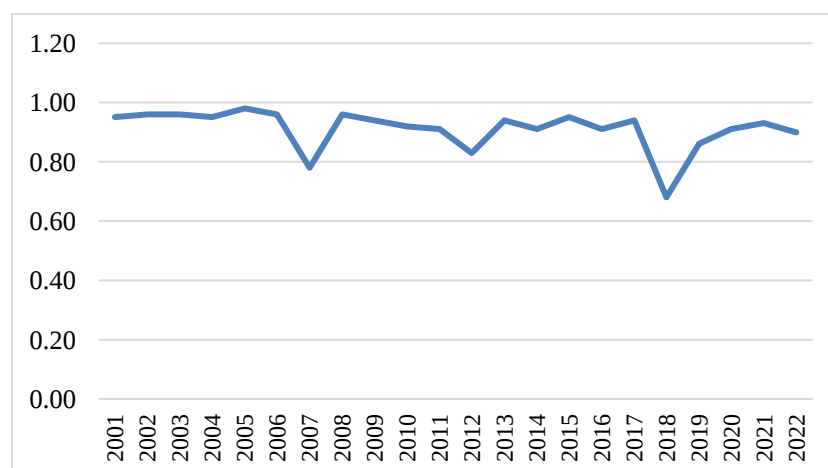


Figure 2. Trade Specialization Index (TSP) Value of Indonesian Coffee

In 2008-2011, the coffee sector was in a maturation stage. However, in 2012, the ISP index dropped to a growth stage with a value of 0.83. This indicated a significant increase in coffee imports, with import volumes in 2012 reaching 52,645 tons, up from 18,108 tons the previous year—a 190% increase. This situation arose because the potential growth in coffee production was not matched by improvements in production capacity and regulations that could promote coffee exports.

The relationship between coffee production and export performance is significantly influenced by external economic factors, including exchange rates and government regulations. For instance, Argaie (2021) found that the negative and insignificant relationship between GDP and coffee exports in Ethiopia indicates a trend toward export diversification, which has led to a decline in coffee's share of total exports. Jaramillo et al. (2011) this decline can be attributed to heavy government intervention and high marketing costs, which historically have limited the revenue that producers receive from coffee exports. Such regulatory challenges hinder the ability of producers to capitalize on potential growth opportunities in the coffee market.

In 2013-2017, the sector was again in the maturation stage. However, in 2018, the ISP index unfortunately reverted to the growth stage, recording its lowest index during the 2021 to 2022 period at 0.68. This index indicated that Indonesia was in an import substitution phase. This was evidenced by the high import volume of 78,847 tons, while the export volume was only 279,961 tons. This occurred due to a decline in Indonesian coffee production caused by extreme weather conditions. According to Yuniarta (2018), the drop in coffee production in 2018 was due to the damage of 158,593 hectares of coffee plantations out of a total of 1.25 million hectares. Additionally, coffee plant rejuvenation was needed to optimize coffee production.

However, Indonesia's trade conditions can return to the maturation stage from 2019 to 2022. According to Amanda and Rosiana (2023), Indonesia has become a net exporter by utilizing its technological standards. The decline in ISP in 2018 also occurred in other producing countries such as Colombia, Honduras, Uganda, and India. This change in Indonesia's cycle needs to be associated with the implementation of coffee farming itself and the competitive position of Indonesian coffee in the global coffee trade.

To increase coffee exports and competitive position in the global market, one way is to improve the quality of coffee beans exported. This includes avoiding the practice of harvesting with a green picking system and improving quality through the application of certification to Indonesian coffee products. In addition, support from the government is also very necessary. Plantation revitalization efforts can be carried out by expanding the planting area and rejuvenating plants, thus increasing the productivity, production, and export of Indonesian coffee.

In improving coffee exports and competitiveness in the international market, coffee export policies and strengthening quality standards need to be implemented. Strengthening quality standards can ensure that the exported coffee meets international standards, in terms of taste quality, cleanliness, and food safety. Certification supports coffee farmers in obtaining international certifications such as Fair Trade, Organic, or Rainforest Alliance which can increase the selling value of coffee in the international market (Lee & Bateman, 2021; Oktami et al., 2014; Tiffen, 2019).

CONCLUSION AND SUGGESTION

Revealed Comparative Advantage (RCA) of Indonesian coffee from 2001 to 2022 has an average RCA value of 3.69. Although the RCA value over the last 21 years is ≥ 1 , the percentage of Indonesian coffee in the world market is still very low, only around 2%-4% of the world's total exports. Therefore, the comparative advantage of Indonesian coffee in the world needs to be improved to compete with the world's main coffee exporting countries. This can be achieved by enhancing production efficiency through the adoption of advanced agricultural practices, increasing the quality

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of coffee beans to meet international standards, and promoting certification such as organic and fair trade. Furthermore, focusing on specialty coffee, such as Arabica from Gayo, Toraja, or Kintamani, can position Indonesian coffee as a premium product in the global market. Specialty coffee, with its unique flavor profiles and cultural value, appeals to niche markets with higher purchasing power. Investing in branding, storytelling, and participation in international coffee expos can strengthen recognition of Indonesian specialty coffee. Additionally, providing training and support for farmers to improve post-harvest handling and processing techniques will ensure consistent quality, further boosting the reputation of Indonesian coffee.

The competitiveness of Indonesian coffee in the long-term and short-term ECM estimates is significantly affected by the value of Indonesian coffee exports, the volume of Indonesian coffee exports, and real GDP per capita at a significant level of 5%. Meanwhile, the exchange rate of the rupiah against the US dollar does not have a significant impact on the competitiveness of Indonesian coffee in the international market. To enhance Indonesia's competitiveness, efforts can be made by increasing export value, export volume, and managing foreign exchange budgets wisely, maintaining export stability, and reducing exchange rate volatility.

Based on the Trade Specialization Index (TSI) calculations, Indonesia has a positive TSI Index, indicating that Indonesia is a coffee-exporting country. This is evidenced by Indonesia's coffee TSI from 2001 to 2022 being positive, ranging from 0 to 1. Based on the growth rate of coffee commodities in trade, Indonesia is at the export maturation stage or tends to become a net exporter country with an average ISP value over the past 21 years of 0.91.

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