

Analysis of Indonesia's Coffee Export Trade Patterns to ASEAN Countries in 2011-2024

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Abstract

Purpose: Coffee is a commodity that is very popular with the people at home and abroad. In Indonesia, coffee has economic value and is an attraction for an agrarian country. Where in the agricultural sector, especially in coffee commodities, Indonesia has many characteristics that other coffee does not have. This study aims to provide an overview of how coffee exports in Indonesia can affect state revenue, distance between countries and also exchange rates.

Methodology: Using the Poisson Pseudo Maximum Likelihood (PPML) regression model, the Gravity model. Using panel data from all countries that joined ASEAN in 2011-2024. Based on the results of this study, it is shown that the GDP variables of the country of origin and the distance between countries have a significant negative influence on the value of Indonesian coffee exports.

Results: Meanwhile, the variables of the GDP of the destination country and the exchange rate have a significant positive effect on the value of Indonesia's coffee exports.

Applications/Originality/Value: The Gravity model using PPML regression provides much more accurate estimates in the context of bilateral trade data that are often zero, so that they can be used as a basis for other commodity trade policy analysis. Integrating exchange rate and distance factors simultaneously to see how these variables relate to the value of Indonesian coffee exports, enriching the economic literature of agricultural commodity trade. It offers an empirical basis for policymakers to develop more appropriate strategies to improve Indonesia's coffee export performance through exchange rate strengthening, logistics efficiency, and mapping market opportunities in ASEAN.

Keywords: Exports, GDP, Distance, Exchange Rate

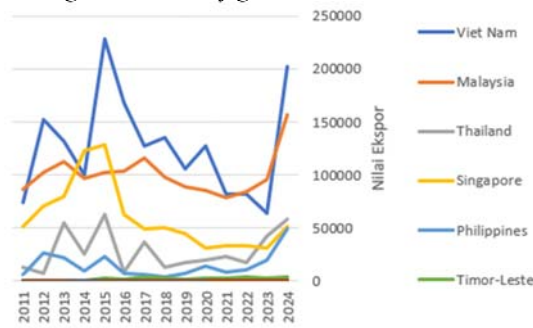
Introduction Section

Indonesia is an agrarian country that is rich in natural resources and diversity of flora and fauna, of course it is a leading force for developing countries like Indonesia. This is what makes Indonesia a country known as the equatorial emerald in ASEAN neighboring countries. Because Indonesia is geographically located just below the equator which is dominated by a rainy and hot climate, it is suitable for farming. With abundant natural resources in the form of fertile soil and a tropical climate that is beneficial to the agricultural sector, it makes a significant contribution to economic growth where the agricultural sector in Indonesia is able to increase state revenue and create more jobs.

In the agricultural sector in Indonesia, coffee is one of the largest commodities that can be relied on because Indonesia is the fourth largest coffee producer in the world after Brazil, followed by Vietnam as Indonesia's neighbor. This is an added value in the international market because coffee in Indonesia has a distinctive taste and many variations such as civet coffee, Toraja coffee and Javanese coffee. Based on one of the largest revenue contributing commodities in Indonesia with total coffee production changing every year. Coffee is a commodity whose demand is very high after petroleum (Mengistu et al., 2020).

Although the demand for coffee in Indonesia is quite high, Indonesia is still lagging behind its competitors such as Brazil which is the number one coffee exporter in the world and neighboring countries such as Vietnam which are competitors in ASEAN. Because the quality of coffee in Indonesia needs to be improved and also increase competitiveness to compete with other countries (Nadiyah Ananda et al., 2023). So the quality of coffee is very important because not all soils can produce good quality coffee beans. Quality coffee will be followed by an increase in demand for coffee, if the coffee has good quality and taste, then consumers tend to increase their purchasing power in coffee consumption. With the increasing demand for coffee in destination countries, namely ASEAN countries such as Vietnam and Malaysia. This greatly affects

international trade where if the demand for coffee exports in the destination country increases, it will have an impact on increasing the country's foreign exchange which is very good for Indonesia's economic growth.



Graph 1. The value of Indonesia's coffee exports to ASEAN.

Source: Trading Map

Based on Chart 1, during the period 2011 – 2024, it can be seen that Vietnam is the country that imports the most coffee from Indonesia even though Vietnam is the second largest coffee-producing country in the world after Brazil. Because of the high domestic demand which is influenced by the very high purchasing power of the domestic community for coffee commodities. Therefore, domestic production is not enough and to meet the demand for robusta variant coffee, it is necessary to import it from Indonesia as a robusta-producing country in the first place (Atmadji et al., 2019). In this period, coffee exports in Indonesia fluctuated from 2015 more to 2023 due to the weakening of the rupiah exchange rate (Bank, 2024). Because the weakening of the rupiah can affect the value of Indonesian coffee exports. With the weakening of the exchange rate, Indonesia's coffee export rate is getting cheaper, where ASEAN countries prefer to import coffee from Indonesia which causes the value of exports to the destination country to rise. If there is a strengthening of the value of the domestic currency, it can have an impact on the lack of competitiveness of export commodities because commodity prices become expensive for foreign consumers (Anton Wijaya; Rahma Nurjanah; Candra Mustika, 2018).

In international trade activities, distance is an important thing to consider in starting cooperation between the country of origin and the destination country, because if the distance between the country of origin and the destination country is getting closer, then the cost of transportation is cheaper which causes the value of exports to increase (Deviyantini, 2017). The longer the distance between countries, the more expensive the cost of transportation for destination countries such as Vietnam and Myanmar (Jienwatcharamongkhon, 2013). This allows destination countries to prefer to increase the value of exports so that transportation costs are cheaper.

This research is motivated by changes in Indonesia's coffee exports to ASEAN trading partners which are influenced by several factors such as economic growth, distance, and exchange rates. This study also aims to analyze what factors affect the value of exports and determine the factors that change the competitiveness of coffee commodities in ASEAN. The Theory of Comparative Advantage invented by David Ricardo explains how a country that has advantages in the production of goods will benefit more, because the country has an absolute advantage where the destination country does not have such advantage. The Theory of Gravity model was used by Jan Tinbergen which describes international trade relations that are influenced by economic growth and distance between countries.

Literature Review

Theory

In general, international trade is where two countries need each other and work together to meet the country's demands. International trade aims to improve the quality of life in a country (Suryanto et al., 2022). If a country has a demand that cannot be obtained in its country, then it will import the goods from other countries to meet the needs of life. In international trade activities, a country has a greater resource advantage than the destination country to expand the international market. In international trade, there is a relationship between distance and growth rate in a country called the Gravity Model which was introduced by Jan Tinbergen through his book (Salette et al., 1965). Economic growth assesses how an economy generates a surplus in a country over a period of time (Santoso et al., 2021). Gross Domestic Product (GDP) is an economic indicator used to determine how a country is performing (Sujianto et al., 2024). This shows a comparison of economic growth between countries and how the economic prosperity of a country is, using real GDP.

Distance in international trade is the distance between the country of origin and destination, where the farther the distance between countries will increase the cost of transportation. (Gowland, 2010) This is as explained in the book where the distance between countries is important to know how much transportation costs are needed that the destination country bears. So distance is very important to measure how distance affects the value of exports. The value of a country's currency is a means of transaction in international trade between two countries that refers to the value of the dollar, as the dollar is a strong currency among other countries. The exchange rate in a country is classified into two, namely the nominal exchange rate and the real exchange rate. The relationship between nominal exchange rate and real exchange rate (A. M. Ginting, 2013), Formulated :

$$\text{Real Exchange Rate} = \text{Nominal exchange rate} \times \frac{\text{Trading partner price index}}{\text{Domestic price index}}$$

Previous Research

In previous research, it was discussed about the application of Gravity Model about Indonesia's international trade with ASEAN countries (Ambarita et al., 2020). Explained that the estimation of the results of the export model to GDP in ASEAN countries has an effect on Indonesia's exports to ASEAN countries has positive results. This is because if economic growth in ASEAN countries increases, exports in Indonesia will also increase. The study also states that the ratio of industry to GDP has a positive impact on Indonesia's exports. If the industries of ASEAN countries increase, then the industry will increase its imports. Meanwhile, the variable that negatively impacts Indonesia's exports and imports to ASEAN countries is the distance that has a negative impact. This study used nine ASEAN members for the period 2010 – 2017. ASEAN countries are Indonesia's main partners, including Malaysia, Laos, Brunei, and Thailand.

In the previous study, it was analyzed how coffee production and export in Indonesia to ASEAN countries and the factors that can affect coffee exports in Indonesia (C. P. Ginting et al., 2019). This study uses panel data using coffee export volume data in Indonesia from 1997 to 2014. From the results of the estimate using panel data, there was an increase in the dollar which had a negative impact on coffee exports in Indonesia. This is because the exchange rate has increased, reducing the demand for coffee exports in Indonesia. In addition, the GDP variables of ASEAN countries have a positive effect on Indonesian coffee exports. With economic growth tending to be positive in 1997 – 2014, the domestic market of the destination country has a large absorption of imports. This makes ASEAN a fostered country for Indonesian coffee exports, because it has a positive impact on the destination country.

Research that discusses the theory of comparative advantage proposed by David Ricardo (Abdan Sifa et al., 2024). This study discusses how Indonesia's comparative advantage in trade policy in Indonesia in the agricultural sector is relatively important. This study implements how comparative advantages in palm oil trade policies in Indonesia. Using a descriptive qualitative approach, which uses a strong theoretical foundation from sources relevant to the research.

Analyze how exchange rates affect coffee exports in Indonesia (Lubis et al., 2023). This research has a novelty in the form of inflation variables as an intervention, which makes this variable an intermediary between the exchange rate and the value of coffee exports in Indonesia through inflation. This study uses data from BPS and the International Coffee Organization and uses quantitative analysis methods. The results of estimates show that the exchange rate has a positive effect on coffee exports in Indonesia, so that if the exchange rate increases, there will be an increase in the value of coffee exports. The results of the path analysis found that inflation did not have a significant effect on the exchange rate and export value of coffee in Indonesia.

Research Methods

Data Types and Sources

In this study, secondary data was used in the form of annual time series panel data from 2011 – 2024 and cross-sectional data from ten countries in ASEAN, including Malaysia, Singapore, Brunei Darussalam, Thailand, Vietnam, Laos, the Philippines, Malaysia, Timor Leste, and Cambodia. Data were taken from the Trade Map for the value of coffee exports,

the Word Bank for the exchange rate, and CEPII for the geographical distance as well as the GDP of the home and destination countries.

Analysis Method

This study uses the *Poisson Pseudo Maximum Likelihood (PPML)* estimation model for gravity models (Santos Silva et al., 2006), PPML's method for modeling rare events, so that response variables are highly likely to have a value of zero (Fauziah et al., 2021). In the PPML model, it is useful to overcome Zero Trade Flow, Where in international trade there is often a zero export value in the destination country because the destination country every year does not always have the value of imports from the country of origin.

In this study, the variable used in this study has one dependent variable, namely exports which explain the value of Indonesia's exports to the destination country. These independent variables include the GDP of the country of origin which explains the Gross Domestic Product (GDP) which explains Indonesia as an exporter that uses the value of coffee production on a national scale, the GDP of the destination country which explains the *Gross Domestic Product (GDP)* of how much coffee imports are worth from Indonesia, the distance between countries which explains the geographical distance between the capital city of Indonesia and the capital city of Indonesia. destination country, and an exchange rate that describes the currency exchange rate between the destination and the country of origin.

Data processing using *STATA software*. Data estimation data aggregation panel Time series and data Cross-section (Sakti, 2018). Use *Gravity Model* to find out what are the factors affecting coffee exports in Indonesia in ASEAN countries in 2011-2024. The models used are as follows.

$$\text{LnEXP}_{ijt} = \beta_0 + \beta_1 \text{LnGDP}_i + \beta_2 \text{LnGDP}_j + \beta_3 \text{LnDST}_{ij} + \beta_4 \text{LnKURS}_{ij} + \varepsilon_{it}$$

Information:

i	:	Indonesia
j	:	ASEAN countries
t	:	Research time period 2011 - 2024
β_0	:	Constanta
$\beta_{1,2,3,4}$:	Expected parameters (n=1,2,3,4)
LnEXP_{ijt}	:	The export value of Indonesian coffee
LnGDP_i	:	The value of economic growth in Indonesia
LnGDP_j	:	Economic growth value of ASEAN countries
LnDST_{ij}	:	Indonesia's distance from ASEAN countries
LnKURS_{ij}	:	Currency exchange rates
ε_{it}	:	Error

Results and Discussion

The following are the results and discussion of data processing in this study using the *Poisson Pseudo Maximum Likelihood (PPML)* analysis method using the *Gravity Model*.

Number of parameters: 5
 Number of observations: 107
 Pseudo log-likelihood: -899913.16
 R-squared: .66168982
 Option strict is: off

ekspor	Robust		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
gdp_o	-3.03e-09	4.42e-10	-6.86	0.000	-3.89e-09	-2.16e-09
gdp_d	8.09e-09	7.83e-10	10.33	0.000	6.55e-09	9.62e-09
dist	-.0011859	.0001372	-8.64	0.000	-.0014549	-.0009169
kurs	3.765162	.3089232	12.19	0.000	3.159684	4.370641
_cons	12.65539	.2994802	42.26	0.000	12.06842	13.24237

The gravity models used in this study are as follows:

$$\ln EXP_{ijt} = 12,65539 - 3,03 \ln GDP_i * + 8,09 \ln GDP_j * - 0,0011859 \ln DST_{ij} * + 3,765162 \ln KURS_{ij} * + \varepsilon_{it}$$

$R^2 = 0.66$; Prob. F-stats = 0.000

Source: Print out of STATA

Description: * Significant at α 0.05

The F-test yields a statistical F-probability of 0.000 which means less than α 0.05; so together, the GDP of the country of origin, the GDP of the destination country, the distance between countries, and the currency exchange rate affect the value of Indonesia's coffee exports. Furthermore, the determination coefficient (R2) is 0.6616 which means that 66.16% of the variation in the value of Indonesia's coffee exports is due to the GDP of the country of origin, the GDP of the destination country, the distance between countries, and the currency exchange rate, while the remaining 33.84% is due to the variation of variables outside the model.

Real GDP in Indonesia as the exporter's country of origin has a negative coefficient of -3.03 with a statistically significant probability of 0.000 at α 0.05. This means that if the real GDP in Indonesia increases by 1%, then the value of Indonesia's coffee exports to ASEAN countries will decrease by -3.03% Ceteris Paribus. These results are in line with research (Ardila Prihadyatama, 2022). This means that the coffee market produced on a national scale is more distributed to local business actors. Because the purchasing power of people in Indonesia for coffee commodities has increased, which increases coffee consumption and decreases the amount of Indonesian coffee export value exported to ASEAN countries.

Real GDP in ASEAN countries as a destination country has a positive coefficient of 8.09 with a significant statistical probability of 0.000 at α 0.05. Where if the real GDP in ASEAN countries increases by 1%, then the value of Indonesia's coffee exports to ASEAN countries will increase by 8.09. The increase in GDP in this destination country shows that the market size of the destination country can increase the value of Indonesian coffee exports. Simply put, coffee sales in destination countries increase every year which affects the value of coffee exports from Indonesia because the demand for coffee from destination countries is increasing.

The distance between Indonesia and ASEAN countries shows the negative coefficient of Indonesian coffee exports. With a coefficient value of -0.0011859 with a significant t-statistical probability of 0.000 at α 0.05. Where if the distance increases by 1%, then the value of Indonesia's coffee exports decreases by -0.0011859. These results are in line with previous research (Saptanto et al., 2017). This means that if the distance between Indonesia and ASEAN countries is measured by how far the capital of Indonesia is from the capital of ASEAN countries, the farther the distance between the destination country and the country of origin, the greater the transportation cost borne by the destination country. This can affect the value of Indonesian coffee exports to ASEAN countries. It is also related to Newton's law of gravity, which is that the farther away an object is, the smaller the relationship.

The real exchange rate of the country of origin with the destination country shows the value of a positive coefficient for Indonesian coffee exports. With a coefficient value of 3.765162 with a significant t-statistical probability of 0.000 at α 0.05. Where if the exchange rate increases by 1%, then the value of Indonesia's coffee exports increases by 3.765162. This means that when the value of the rupiah depreciates, the price of coffee in Indonesia tends to be cheaper compared to the

price of coffee in the destination country. Because, with the depreciation of the rupiah, consumers from ASEAN countries prefer to import coffee from Indonesia at a low price rather than buying coffee in a destination country that is more expensive. This affects the value of Indonesia's coffee exports which will increase in line with the demand for coffee from ASEAN countries.

The effect of the GDP of the country of origin on the value of Indonesian coffee exports

On the independent variable of the GDP of the country of origin, it shows that the value of Indonesia's GDP has a significant negative effect on the value of Indonesia's coffee exports. Proving that if Indonesia's GDP coefficient increases, the value of Indonesia's coffee exports will decrease. Where if people's income in Indonesia increases, it will increase the consumption of coffee commodities. So that domestic demand for coffee commodities will increase, which causes coffee companies to increase the amount of coffee production, so additional coffee supply is needed. This causes the supply of coffee for export to ASEAN countries to decrease. These results are in line with research (Hartono et al., 2025) which concludes that GDP growth from exporting countries can reduce the value of exports. In research (Eka Sudarusman, 2020) also explained that the increase in the value of domestic GDP leads to a decrease in the value of exports. The high demand for domestic coffee has caused a slowdown in the supply of Indonesian coffee exports.

The effect of destination country GDP on the value of Indonesian coffee exports

Inversely proportional to the GDP variable of the country of origin, the GDP variable of the destination country actually has a significant positive effect on Indonesian coffee exports. Where if the income from the destination country increases, the demand for coffee from Indonesia increases. Many ASEAN countries such as Singapore, Vietnam, Malaysia and Thailand have experienced the growth of the coffee shop industry in line with the increasing consumption of coffee there to meet the domestic coffee supply. So that the demand for coffee in the destination country increases, causing the value of Indonesian coffee exports to increase, this research is in line with (Wiranthi et al., 2019) where GDP in European countries increased so that the demand for Indonesian tuna to European countries also increased, with the increase in demand for tuna from Indonesia. About the findings (Ula, 2024) shows that GDP is one of the main indicators that affect the value of imports in the destination country. Where the increase in economic growth in the destination country shows that the level of purchasing power in the destination country is very high and has the potential to expand the export market from the country of origin.

The effect of geographical distance between countries on the value of Indonesian coffee exports

The distance variable between countries proves that the influence of distance between ASEAN countries on Indonesian coffee exports has a negative effect. Distance is one of the obstacles in international trade activities because the distance traveled by the country of origin to the destination country greatly affects the transportation costs borne by the destination country. Although Indonesia and ASEAN countries are neighbors to each other, they are geographically close to each other. This remains an obstacle to Indonesia's coffee exports to ASEAN countries. This research is in line with the findings (Natanael, 2025) found that the geographical distance between Indonesia and ASEAN countries is an obstacle to trade, thus limiting Indonesia's export activities. The results of the study are strengthened by the findings (Serikat et al., 2025) which shows that Indonesia's palm oil commodity exports are greatly influenced by the distance between countries because the shipping costs are quite high, the farther the distance to the destination country, the greater the cost borne by the destination country. So that it has an impact on Indonesia's palm oil exports which tend to decline. However, on the other hand, if the distance between the country of origin and the destination country has cooperation in international trade, then transportation costs tend to be cheaper, causing the value of exports to rise.

The effect of exchange rates between countries on the value of Indonesian coffee exports

The exchange rate variable shows a positive influence on the value of Indonesian coffee exports. Where when the rupiah exchange rate depreciates, Indonesian coffee prices tend to be cheap compared to other countries, thereby increasing the market share in ASEAN. In international trade, the depreciation of the currency exchange rate makes a country's exports rise because the price is cheaper or fall so that it is more competitive. This research is in line with the findings (Taufiq et al., 2020) with a positive influence of the exchange rate on the value of Indonesia's rubber exports, because the weakening of the rupiah exchange rate makes the price of Indonesian rubber cheaper than that of competing countries. This research is strengthened by the findings of (Ratana et al., 2012) shows that the exchange rate has a positive effect on the value of Indonesia's exports, where if the exchange rate strengthens it will reduce the value of Indonesia's rubber exports. Simply

put, if the value of the rupiah strengthens, it causes Indonesian coffee prices to tend to be expensive as an importing country will prefer to lower the value of Indonesian coffee exports or look for other trading partners.

Conclusion

The conclusions that can be obtained in this study with the results of Gravity Model estimation using the Poisson Pseudo Maximum Likelihood (PPML) analysis method which uses panel data from the value of Indonesian coffee exports to ASEAN countries in 2011 – 2024, knowing that Indonesia's GDP variables and Indonesia's distance from ASEAN countries have a significant negative influence on the value of Indonesian coffee exports. This means that the value of Indonesian coffee exports will decrease when the demand for domestic coffee in Indonesia increases so that it is preferred to be distributed to local entrepreneurs to meet the needs of domestic consumers and the farther Indonesia is from the destination country, the more costs are incurred, This causes the value of Indonesian coffee exports to decrease.

Meanwhile, the variables of the GDP of the destination country and the exchange rate have a significant positive effect on the value of Indonesia's coffee exports. Where the demand for coffee in destination countries is increasing because coffee from Indonesia has special characteristics compared to coffee owned by destination countries. This is in accordance with the theory of comparative superiority discovered by David Ricardo explaining how a country that has an advantage in the production of goods will benefit more, because the country has an absolute advantage. In the exchange rate variable, the depreciation of the rupiah exchange rate causes the value of Indonesian coffee exports to increase because Indonesian coffee tends to be cheaper than the coffee of the destination country. In this study, the four independent variables have a positive and negative influence on Indonesia's coffee exports to ASEAN countries. The results of this study are the need for a strategy to increase coffee productivity in Indonesia so that the supply of coffee exports is better maintained and the increase in domestic coffee commodity consumption does not interfere with Indonesia's coffee exports to ASEAN countries. International trade cooperation with ASEAN countries is needed to reduce barriers to transportation costs of export-imports. The stability of the rupiah currency exchange rate is also the most important factor in international trade to maintain the competitiveness of Indonesian coffee exports.

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