Agro Bali : Agricultural Journal
Vol. 7 No. 3: 760-773, November 2024
e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

Determining Factors of Indonesian Coffee Demand in the US Market: Using LA/AIDS Approach

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Article history: submitted: April 25, 2024; accepted: November 31, 2024; available online: November 25, 2024

Abstract. Indonesia has long been the largest coffee producer and exporter in the world. However, competing Asian countries, namely Vietnam and India, dominate the world coffee trade as ranked fourth and sixth. To face increasingly competitive market conditions, it is necessary to look at the determinants of demand for Indonesian coffee and its competition. This research provides an update using the LA/AIDS (Linear Approximate Almost Demand System) model approach to explore the factors that influence demand for coffee from Indonesia, Vietnam, and India, focusing on price elasticity and coffee expenditure elasticity in the US market. The data is time series data from 1992-2021 and the US market as the destination country. The results show that the factors influencing demand for Indonesian coffee in the US are expenditure, Indian coffee prices, GDP per capita, population, unemployment rate, and CPI. Coffee from Indonesia is sensitive to US spending changes (1,010%) and elastic. The price elasticity value for Indonesian coffee has a negative sign. The cross-price elasticity value of Indonesian coffee compared to Vietnamese coffee is complementary, whereas Vietnamese coffee to Indonesian coffee is a substitute. Meanwhile, Indonesian coffee is complementary to Indian coffee and vice versa.

Keywords: Almost Ideal Demand System; coffee; demand elasticity; LA/AIDS

INTRODUCTION

Strategic agricultural commodities for export come from the plantation subsector, one of which is coffee. The special taste of Indonesian coffee has attracted market interest and made Indonesia the fourth largest producer and exporter in the world after Brazil, Vietnam, and Colombia (Perdana et al., 2018). ICO (International Coffee Organization) noted that world coffee production in 2021 decreased by 1.4%, while world consumption increased by 4.2% from the previous year. This gap indicates opportunities for Indonesia to increase its competitiveness through export volume and value. In the last ten years (2013-2022), Indonesia's coffee export volume grew by 4.24% (UNComtrade, 2023). However, it fluctuates from -40.15% to 28.2%, while the total export value decreased by -31.28% (Central Statistics Agency, 2021).

The cause of this fluctuation occurs from the upstream side due to weather factors, while from the downstream side, it is related to input-output prices (de Camargo, 2010; Ebisa, 2017; Läderach et al., 2017). This shows that the development of the Indonesian coffee trade in the international market is still very dynamic (Manalu et al., 2022).

Various studies say (Fitriani et al., 2021; Okim et al., 2022; Zin, 2022) that the price of coffee is a significant determinant of production capabilities and export demand. It was further explained that commodity prices significantly impact the value of commodity exports, so price competition between exporting countries cannot be avoided (To, 2016). The fluctuating coffee prices can result in reduced competitiveness (Manalu et al., 2019). Low coffee prices are the impact of the low quality of coffee products and the limited use of post-harvest technology (Yusiska et al., 2019). In addition, international trade competition is more open and the dominance of the world's large coffee producers is getting stronger (Zuhdi & Yusuf, 2021; Fitriani et al., 2021). Therefore, the concept of competitiveness becomes very crucial for producing countries if they want to survive in the global market.

Competitiveness has long been a concern for exporting countries, to stay in the global trade and economy (Meaza & Emagne, nd). In the last ten years (2012-2022), the largest Indonesian coffee export market is the United States with an average export volume of 54,687 tons and an export value of $255,874 per year (BPS, 2023). Studies found that the

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

competitiveness of Indonesian coffee continued to fluctuate from 2007 to 2017 in the US market (Manalu et al., 2019) and even tended to decrease. Fortunika (2019) states that the Indonesian coffee market share in the US is only 3.8% and this is not commensurate with the large value of coffee exports. On the other hand, Indonesia has competitors with similar characteristics (Fortunika et al., 2021) it is coffee from Vietnam and India. These three countries are Asian countries that export mostly robusta coffee and are dominated by green coffee. Ironically, with so much potential for Indonesia, its competitiveness is still far less than Vietnam in the US market (Savira et al., 2023).

Previous research on the competitiveness of Indonesian coffee was carried out using the Revealed Comparative Advantage (RCA) method. The results show that the competitiveness of Indonesian coffee is lower than Vietnamese coffee, but still higher than Indian coffee (Parnadi and Louisa, 2021). The study from Narulita et al. (2014) analyzed the competitiveness of Indonesian coffee compared to the rest of the world. The results also do not show export competition with certain countries in specific destination markets using demand analysis.

The competitiveness of Indian coffee was also analyzed using RCA and compared with other coffee exporters including Vietnam and Indonesia (Parte et al., 2022). However, the results of the RCA analysis only show the level of competitiveness of each exporting country and are unable to determine trade relations and share comparisons that indicate coffee demand in the importing country.

Several studies have analyzed the competitiveness and determinants of export demand using the Almost Ideal Demand System (AIDS) model approach. The AIDS model was then modified into a Linear Approximation Almost Ideal Demand System (LA/AIDS) by Deaton & Muellbauer due to its nonlinearity (Zin, 2022). The model provides fairly accurate estimates compared to the AIDS model (Alston et al., 1994).

The LA/AIDS model has been widely used because it is more accepted, flexible, and easy to estimate for demand analysis (Alston et al., 1994). (Fortunika et al., 2021; Manalu et al., 2022; Pinto et al., 2022; Zin, 2022). Research related to coffee demand and competitiveness in the US conducted by Habibullah et al (2023) still uses the basic AIDS model.

Meanwhile, Fortunika et al (2019) have used LA/AIDS to see the demand for robusta coffee in bean and powder form on the German market. Zin (2022) has used LA/AIDS to look at the demand for Vietnam, Brazil, and Colombia coffee in the US market. Manalu et al (2020) have examined coffee demand from Indonesia and compared it with Vietnam in three large markets, namely America, Japan, and Germany. The results can indicate complementary or substitution relationships through cross-price elasticity. However, there has been no similar research to look at the demand for Indonesia, Vietnam, and India coffee beans as well as their competition in the US market.

A study from Fortunika (2021) stated that the variables of Indonesian coffee prices, coffee prices of exporting countries, GDP per capita, exchange rates, and import tariffs influence the proportion of Indonesian coffee market share in Germany. Meanwhile, in Manalu (2020), row (rest of world) price factors, exporting country area (non-import tariffs) (Sanitary and Phytosanitary/SPS and Technical Barrier to Trade/TBT), GDP per capita and real GDP significantly influence coffee exports Indonesia in the US market.

The same factors also influence Vietnam coffee exports to the US market. In this research, the variables coffee price, GDP per capita, CPI, population, and the unemployment rate will be used in this research. The three are considered proxies for how the economic conditions of the US community influence coffee demand from Indonesia, Vietnam, and India.

Based on this explanation, Indonesian coffee contributes greatly to state revenues, but on the other hand, it is very volatile in its

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

trade performance (Fitriani et al., 2021). Consequently, it is necessary to pay attention to what factors determine demand so that they can be used to develop future strategies and policy directions. This article will analyze the determinants of Indonesian coffee exports to the US market over a 30-year observation period from 1992 to 2021, and at the same time, calculate its competitor countries, Vietnam and India. This research contributes to a better understanding of the dynamics of the coffee industry in the context of international trade through the LA/AIDS approach. Budget share (w) is estimated using Seemingly Unrelated Regression (SUR) because aggregate expenditure is assumed to be exogenous (Poi, 2012). The method uses developments from B.Poi and is processed with STATA 16.1.

METHODS

This research uses secondary data and quantitative methods with indicators used to look at the problems being analyzed, namely export data including the value and volume of US coffee imports from exporting countries; Indonesia, Vietnam, and India, as well as the total expenditure on US coffee imports over 30 years, 1992-2021. The LA/AIDS approach will be used to analyze coffee export competition between exporting countries (Manalu et al., 2020) with the method from Brian Poi (2012) using STATA 16.1. The LA/AIDS model is used to linearize the non-linear price index according to suggestions from Deaton & Muellbauer, (1980) using the Stone Price Index (Manalu et al., 2020; Pinto et al., 2022; Widarjono, 2018). The basic model of LA/AIDS is presented in **Equation 1**.

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} ln\, P_j + \beta_i \ln(\frac{X}{P*} + \varepsilon_i \quad (1)$$

Where; budget share is commodities imported from exporting countries; constant, commodity prices from exporting countries, X; expenditure or commodity import expenditure, P*; Stone Price Index, error. A linear price index will make it easier for researchers to estimate the coffee demand system in several export destination countries. Its use in estimating demand systems is because researchers have difficulty estimating demand systems with non-linear price indices (Widarjono, 2018). The following is the Stone Price Index formula:

$$\ln P = \sum i\ wi \ln Pi \quad (2)$$

The dependent variable for each equation is the coffee market share from Indonesia, Vietnam, and India. Meanwhile, the independent variables consist of coffee prices in Indonesia, Vietnam, and India, expenditure (total import value), CPI, population, and unemployment rate. These three equations can be written as follows:

$$\begin{aligned} w_1 &= \alpha_1 + \gamma_1 \ln P_I + \gamma_2 \ln P_V + \beta_1 \ln \frac{X}{P*} + \\ &\quad \theta_1 lnGDP_{pct} + \sigma_1 lnCPI_{jt} + \varphi_1 lnPop_{jt} \\ &\quad + \omega_1 lnUnemp_{jt} \varepsilon_i \\ w_2 &= \alpha_2 + \gamma_3 \ln P_I + \gamma_4 \ln P_V + \beta_2 \ln \frac{X}{P*} + \\ &\quad \theta_2 lnGDP_{pct} + \sigma_2 lnCPI_{jt} + \varphi_2 lnPop_{jt} \\ &\quad + \omega_2 lnUnemp_{jt} + \varepsilon_i \\ w_3 &= \alpha_3 + \gamma_5 \ln P_I + \gamma_6 \ln P_V + \beta_1 \ln \frac{X}{P*} + \\ &\quad \theta_3 lnGDP_{pct} + \sigma_3 lnCPI_{jt}\ \varphi_3 lnPop_{jt} \\ &\quad + \omega_3 lnUnemp_{jt} + \varepsilon_i \quad (3) \end{aligned}$$

Notes:

w_1	= budget share of Indonesian coffee imports in the US market
w_2	= budget share of Vietnamese coffee imports in the US market
w_3	= budget share of Indian coffee imports in the US market
P1	= price of Indonesian coffee in the US market
P2	= price of Vietnamese coffee in the US market
P3	= price of Indian coffee in the US market
X	= total value of Indonesian/Vietnamese/Indian coffee imports
P*	= stone price index (stone price index)
GDP_{pct}	= GDP per capita of importing country (j)
CPI_{ijt}	= CPI of importing country (j)
Pop_{jt}	= Populationimporting country (j)
$Unemp_{jt}$	= Unemployment reimporting country (j)
$\alpha, \gamma, \beta,$	

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

$\theta, \sigma, \lambda,$
$\varphi, \omega, \partial$ = regression parameters
ε_i = Error

The next step is that the three equations will be restricted with homogeneity and symmetry constraints, while the adding up property has been fulfilled in the model itself as an advantage of the AIDS model (Fortunika et al., 2021; Pinto et al., 2022). In the Poi (2012) method, restrictions have been imposed in the estimation. The following is the formula for restrictions:

a. Adding up

Adding up is a condition that shows total expenditure in the demand function is equal to total income. The demand function must satisfy the budget constraint so that the sum of the differentiations of the budget constraint on income is equal to 1(Irie, 2018).

$$\sum_{i=1}^{n} \alpha_i = 1, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \beta_i = 0 \qquad (4)$$

b. Homogeneity

Homogeneity is a requirement that states that if income and prices change in the same proportion, then demand for a commodity does not change. The demand function is homogeneous with degree zero in prices and income to ensure that demand is not affected by proportional increases in all prices and income(Irie, 2018).

$$\sum_{=1}^{n} \gamma_{ij} = 0 \qquad (5)$$

c. Symmetry

Symmetry is a property that means the cross-price reduction of demand is symmetrical.

$$\gamma_{ij} = \gamma_{ji} \qquad (6)$$

The estimation results will determine the elasticity value for Indonesian, Vietnamese, and Indian coffee. This research uses uncompensated elasticity (Marshallian) which accommodates income effects and substitution effects due to price changes(Wan et al., 2010). Demand elasticity is categorized into three, namely; 1) own price elasticity, 2) cross price elasticity, and 3) expenditure elasticity. The formula for the three elasticities is:

a. Own-price elasticity

$$e_{ii} = -\delta_{ij} + \frac{\gamma_{ij} - \beta_i s_j}{s_i} \qquad (7)$$

b. Cross-price elasticity (cross-price elasticity)

$$e *_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{s_i} + S_j \qquad (8)$$

c. Expenditure Elasticity

$$\mu_i = 1 + \frac{\beta_i}{s_i} \qquad (9)$$

Where is the coffee price parameter in market j, is the total value of coffee imports in market j, is the share of Indonesian coffee, and is the share of coffee from other exporting countries. Kronecker delta is equal to 1 if i = j (own price elasticity) and 0 if I (cross-price elasticity). $\gamma_{ij}\beta_i\ w_i w_j \delta_{ij} \neq j.$

RESULTS AND DISCUSSION

Descriptive Statistics

The variables used in this research can be seen from the descriptive statistics in Table 1. The data range used in this research is based on minimum and maximum data values. The mean value indicates the average of the data, while the standard deviation provides information about the variance of the data above the average value. The variables w1, w2, and w3 are the coffee budget shares of Indonesia, Vietnam, and India. Meanwhile, p1, p2, and p3 are the prices of Indonesian, Vietnamese, and Indian coffee.

Based on the results of the above parameter estimates in the US market during 30 years of observation (1992-2021), it shows that the proportion of expenditure (budget share) for coffee from Indonesia is around 0.452% and the price range for Indonesian coffee is 2,978 USD. Meanwhile, coffee from Vietnam has a budget share of around 0.497% and a price of around 1,732 USD.

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

Meanwhile, coffee from India has a budget share of around 0.051% and a price of around 2,287 USD. Each budget share percentage is from total US coffee imports. The price variable is the price of coffee from the exporting country per kg. From this value, it can be judged that the highest share of coffee is Vietnam, followed by Indonesia, and finally India. Based on previous research, Vietnamese coffee still outperforms Indonesian and Indian coffee based on its competitiveness in the world market (Ratna and Tety, 2017). In addition, coffee from Vietnam has been strategically designed for cultivation locations to reduce transportation costs (Marsh, 2007), while transportation costs in Indonesia are high. This has an impact on the selling price which is less competitive with Vietnam in the world market (Ratna and Tety, 2017).

Table 1. Summary of expenditure proportion variables and coffee prices in the United States market

Variables	Mean	Std. dev.	Min	Max
		America		
w1	0.452	0.076	0.298	0.604
w2	0.497	0.110	0.206	0.629
w3	0.051	0.061	0.006	0.230
p1	2.978	1.469	1.095	5.732
p2	1.736	0.440	1.000	2.497
p3	2.287	0.899	1.000	3.687

Source: UN Comtrade, 2023 (processed)

Factors Affecting Coffee Demand in the United States

Estimates from the LA/AIDS model are used to analyze the factors that influence the demand for Indonesian coffee in the US market. Parameter estimates can provide a more comprehensive understanding of how coffee demand reacts to various variables, enabling easier analysis in evaluating the impact of policy changes. This model involves several independent variables, including price (value of coffee imports from exporting countries divided by volume), expenditure (total value of imports), Gross Domestic Product (GDP) per capita, CPI, population, and unemployment rate. Table 2 displays the results of the LA/AIDS model estimation for coffee in the United States market.

Table 2 shows that the expenditure variables, Indonesian coffee prices, Indian coffee prices, GDP per capita, population, and unemployment rate significantly influence the share of Indonesian coffee in the US market. For Vietnamese, influencing factors include expenditure variables, GDP per capita, and population, with a significance level of 5% each. Meanwhile, India only has one variable that is significant, namely the price variable for Indonesian coffee.

The expenditure variable has a positive sign of 6.476 with a significance level of 1% for Indonesian coffee. This means that if US spending increases by 1%, Indonesia's coffee share will increase by 6.476%. The expenditure variable has a value of -4.736 with a significance level of 5%, which means that when US expenditure increases by 1%, the share of Vietnamese coffee will decrease by 4.736%. The results show that Indonesian coffee is preferred over Vietnamese coffee in the US market. This finding is contrast to Manalu et. al. (2020), that US spending does not significantly affect the share of coffee exporting countries Indonesia and Vietnam. Research by Chani and Chaudhary (2012) explains that all expenditure components (household expenditure, government expenditure, total investment, and export expenditure) have a statistically significant impact on a country's import demand, and

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

household expenditure has the highest influence.

Table 2. Estimation Results of Coffee Demand Parameters in the American Market

Variable	Indonesia	Vietnam	India
Alpha (Constant)	0.352	1,360**	-0.712*
	(0.352)	(0.014)	(0.074)
Beta (Expenditure)	6,476***	-4,736**	-1,740
	(0.006)	(0.037)	(0.175)
Indonesian coffee prices	0.097*	-0.006	-0.091**
	(0.064)	(0.927)	(0.010)
Vietnamese coffee prices	-0.006	-0.102	0.108
	(0.927)	(0.349)	(0.118)
Indian coffee prices	-0.091**	0.108	-0.017
	(0.010)	(0.118)	(0.776)
GDP per capita	0.095***	-0.073**	-0.021
	(0.007)	(0.036)	(0.294)
POP	-0.479***	0.354**	0.125
	(0.006)	(0.036)	(0.195)
UNEMP	0.006**	-0.004	-0.002
	(0.041)	(0.251)	(0.238)
CPI	-0.002	0.002	0.001
	(0.044)	(0.135)	(0.487)

Note: *** p < 0.01, ** p < 0.05, * p < 0.1. significant level
Source: UN Comtrade, 2023 (processed)

The Indonesian coffee price variable has a positive sign of 0.097 with significance at the 1% level, which means that if the price of Indonesian coffee rises by 1%, it will increase the share of Indonesian coffee by 0.097% in the US market. This is because domestic demand for coffee has decreased, so more Indonesian coffee is exported. Lubis and Rahmani (2023) added that international coffee prices do not affect Indonesian coffee demand, so this is a great opportunity. encouraging Indonesian coffee exports to the world market and this is important to prioritize. In addition, the Indonesian coffee price variable for India has a negative sign of -0.091 with a significance level of 5%. This value means that when the price of Indonesian coffee rises by 1%, it can reduce India's market share by 0.091% in the US market. The analysis results also show that, in fact, the price of Indian coffee also influences the share of Indonesian coffee in the US market with a negative value of -0.091 with a significance level of 5%. This means that when the price of Indian coffee rises by 1%, it results in a decrease in the share of Indonesian coffee by 0.091% in the US market. Based on previous research, the same condition also occurs in the German market, the price of Indian coffee influences the demand for Indonesian coffee. Based on previous research, changes in prices in the country of origin of the commodity will impact changes in demand for the commodity in the export destination country (Manalu et al., 2020; Setiawan & Sugiarti, 2016).

Furthermore, GDP per capita has a positive sign of 0.095 with a significance level of 1%, which means that when US GDP per capita increases by 1%, it impacts

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

increasing the Indonesian coffee market share by 0.095%. Meanwhile, in Vietnam, the sign is negative, namely -0.073, which means that when US GDP per capita increases by 1%, Vietnam's coffee market share falls by 0.073%. These results are from previous research where increasing GDP per capita can reduce or increase demand for commodities in a country (Jhon, 2020; Malau et al., 2022). GDP per capita shows the purchasing power of a country's people and the size of its market so that increasing GDP indicates that the economy is growing well (Hassan Khayat, 2019; Sikder et al., 2020). This is proven, when the GDP per capita of the importing country increases, the demand for imports of agricultural commodities from the exporting country also increases (Bayar, 2014; Malau et al., 2022)

The population variable has a negative sign of -0.479 with a significance level of 1% for Indonesia, meaning that when the US population increases by 1%, the share of Indonesian coffee will decrease by 0.479%. In Vietnam, the population variable has a positive value of 0.354, which means that if the US population increases by 1%, Vietnam's coffee market share can increase by 0.354%. According to Gao and Zhang (2015), the population can have a positive or negative influence. Eshetu (2021) and Li Wenxia et al. (2019) believe that the population size of exporting and importing countries is negatively correlated with trade flows. The larger the population scale of the exporting country, the fewer products are used for export after meeting the needs of its market. The larger the population scale of an importing country, the stronger the country's self-sufficiency and the fewer products it imports from abroad. Meanwhile, according to Brada (1985), Li Xiaozhong, Du Tianhao (2019), and Shang Yuhong (2021) believe that population size has a positive impact on trade flows. Increasing the population scale of exporting countries will increase production and supply and increase export capacity. The larger the population scale of the importing country, the greater the demand for the product, and the greater the tendency of the importing country to increase product imports. According to Eshetu et. al. (2021), the increasing population of trading partner countries will increase production capacity and produce output for the world market, thereby limiting imports from other countries.

The US unemployment rate variable only has a significant effect on Indonesian coffee exports. The value has a positive sign of 0.006 with a significance level of 5 percent for Indonesia, that is, when the US unemployment rate rises by 1% it will increase Indonesia's coffee market share by 0.006%. Statement by Gostkowski, (2018) changes in demographics, such as population growth or changes in unemployment rates, can affect coffee demand. The unemployment rate has little research on its influence on exports, but several studies have analyzed it on economic growth. This is because economic growth will directly affect the unemployment rate. The three are related in that when a country's economic growth is good, it can encourage exports so that the unemployment rate decreases due to the growth in production capacity (Mankiew, 2007). Explained further by Göçer et al. (2013) and Doğan (2012), found that there is a negative relationship between the unemployment rate and exports. When exports increase, the unemployment rate will decrease (Pay, 2014).

Expenditure Elasticity, Own Prices, and Cross Prices of Export Coffee in International Markets

The elasticity calculation in this research utilizes Marshallian (Uncompensated) elasticity of demand, which includes income effects and price effects. Expenditure elasticity and price elasticity are economic concepts that can be used to understand the response of coffee demand in international markets to changes in income and price (Castro et al., 2017; Widarjono, 2018). Expenditure elasticity measures the extent to which the quantity of coffee demanded

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

changes in response to changes in consumer income (Eric et al., 2017), while price elasticity measures the extent to which the quantity of coffee demanded changes in response to changes in the price of that coffee (Varian, 2014). In price elasticity, there are calculations of own price elasticity and cross-price elasticity (Rifin, 2010; Manalu et al., 2022; Namini, 2017).

a. Expenditure Elasticity

Expenditure elasticity describes the sensitivity of coffee demand to changes in income. If the expenditure elasticity value is positive, it can be interpreted that coffee is a normal good (Widarjono, 2018), and if there is an increase in income it can cause an increase in demand for coffee (Manalu et al., 2020). Conversely, if the elasticity of expenditure is negative, it means that coffee is an inferior good, and an increase in income can lead to a decrease in demand for coffee (Pinto et al., 2022).

Table 3. Expenditure Elasticity

Exporting Country	Importing Country
	United States of America
Indonesia	1.010
Vietnamese	0.893
India	1.951

Source: UN Comtrade, 2023 (processed)

Table 3 shows that the elasticity of coffee expenditure from Indonesia, Vietnam, and India in the US market, a 1% increase in US imports will increase coffee imports from Indonesia by 1,010% ; a 1% increase in US imports of coffee from Vietnam would increase imports by 0.893% ; and a 1% increase in US imports would increase India's coffee imports by 1,951%. All of these values are positive (E>0), which means that coffee from each exporting country is a normal good for the US. So, when the total value of US imports increases, demand for coffee from Indonesia, Vietnam, and India will increase. Overall, Indonesian, Vietnamese, and Indian coffee is considered a normal commodity in the US market because it has positive elasticity values. This finding is in line with research by Wan et al (2010); Alnafisa et al. (2020); and Pinto et al (2022); that is, when the importing country's income rises, demand for a commodity from the exporting country will increase.

b. Own Price Elasticity

Price elasticity measures the extent to which the quantity of coffee demanded changes in response to changes in the price of coffee itself. If the price elasticity is elastic (greater than 1), it means that a price change will cause a proportionally larger change in the quantity demanded. Conversely, if the price elasticity is inelastic (less than 1), a price change will cause a smaller proportional change in quantity demanded (Alnafissa et al. 2020; Wan et al., 2010; Zin, 2022).

Table 4. Own price elasticity

Exporting Country	Importing Country
	America
Indonesia	-0.790
Vietnamese	-1,057
India	-0.609

Source: UN Comtrade, 2023 (processed)

Based on table 4, shows that the price elasticity value of Indonesian, Vietnamese, and Indian coffee is negative. All three are under the law of demand, where when the price of an item increases, the demand for that item will decrease (Manalu et al., 2020; Pinto et al., 2022; Varian, 2014). Meanwhile, coffee from Vietnam has an elasticity value of more than 1 so it is elastic, conversely, coffee from Indonesia and India has a value of less than 1 so it is inelastic (Amzul Rifin, 2010; Manalu et al., 2020; Walter & Snyder, 2007). The price elasticity of Indonesian coffee is -0.790, which means that a 1% increase in the price of Indonesian coffee results in a decrease in demand in the US market of 0.790%. Vietnam's elasticity value is greater than Indonesia's (-1.057), which means that when the price of Vietnamese coffee increases, demand for it in the US market will decrease by 1.057%. Indian coffee has the smallest elasticity value (-0.609), which means that an increase in the price of Indian coffee by 1% will reduce its demand in the US market by 0.609%.

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

From the elasticity value in the US market, the price elasticity of Indonesian coffee is in second place, namely -0.790 (inelastic), followed by India at -0.609 (inelastic) while the first position is Vietnam, reaching -1.057 (elastic). If we look at this situation, it is beneficial for Indonesia because changes in coffee prices from Vietnam can cause changes in demand for coffee in the US that are more responsive. For example, if the price of imported coffee from each country increases by 1%, the largest decrease in demand will occur for coffee imports from Vietnam, namely 1,057%. Meanwhile, the decline in coffee imports from Indonesia (0.790) and India (0.609) was lower, and this value was smaller than the elasticity of Vietnamese coffee. This shows that Indonesian and Indian coffee is still the main choice compared to Vietnamese coffee in the United States market. These results also show that coffee from Vietnam is a luxury good because its elasticity value is greater than one (>1). So, when there is an increase in the total value of imports in the US, this results in a greater increase in demand for coffee from Vietnam in proportion to the elasticity value obtained. Meanwhile, the elasticity values for Indonesian and Indian coffee are smaller than 1 and indicate they are staple goods. So, when the total value of US imports increases, demand for Indonesian and Indian coffee will increase in proportion to the elasticity value obtained.

c. Cross Price Elasticity

Table 5 shows that the cross-price elasticity of Indonesian and Vietnamese coffee in the US market is inelastic because it is less than one (<1). The cross-price elasticity between Indonesia and Vietnam is negative (-0.027), which means that the two are complementary or complement each other. This means that when the price of Indonesian coffee rises by 1% in the US market, it will result in a decrease in demand for coffee from Vietnam by 0.027 %. On the other hand, the cross-price elasticity of Vietnamese coffee to Indonesia shows a positive sign (0.028), so the relationship is substitution or mutual replacement. This means that when the price of coffee from Vietnam rises by 1 %, demand for coffee from Indonesia will increase by 0.028 % in the US market.

The findings show that Indonesian coffee determines the price and demand for coffee in the US market compared to Vietnamese coffee. This can be seen when the price of Indonesian coffee rises, the increase in the price of coffee from Vietnam will reduce demand. However, when the price of coffee from Vietnam rose, demand for Indonesian coffee increased. This finding is not in line with previous research that if the price of Indonesian coffee rises it will increase demand for coffee from Vietnam, and vice versa $\varepsilon < 1$(Fortunika et al., 2021; Manalu et al., 2020).

Table 5. Cross elasticity in the United States

Exporting Country	Cross Elasticity		
	Indonesia	Vietnamese	India
Indonesia		-0.027	-0.193
Vietnamese	0.028		0.136
India	-2.137	0.795	

Source: UN Comtrade, 2023 (processed)

Meanwhile, Indonesia's cross-price elasticity towards Indian coffee is also less than one (inelastic), but on the other hand, India's towards Indonesia is more than 1 (elastic). Looking at the cross-price elasticity value between Indonesia and India has a negative sign (-0.93), which means that the relationship between the two is complementary. This means that an increase in the price of Indonesian coffee by 1% causes a decrease in demand for coffee from India by 0.193% in the US market. Meanwhile, the cross-price elasticity value for Indian coffee with Indonesia, it also has a negative sign (-2.137) so it indicates that both also have a complementary relationship. This means that when the price of Indian coffee rises by 1% it will have an impact on decreasing demand for Indonesian coffee by

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

2.317%. This finding is in line with previous research which also states that Indonesian and Indian coffee both show a complementary relationship (Fortunika et al., 2021).

Furthermore, demand for coffee exports in the US market from exporting countries Indonesia, Vietnam, and India appears to be more influenced by expenditure elasticity. If we look at the expenditure elasticity value, it is higher than the own price elasticity value and cross-price elasticity value. So this indicates that the amount of coffee demand in the US market is influenced by the country's income level. Moreover, Indonesian coffee is still the main choice for the US market when viewed from its price elasticity value, even though it is still ranked second after Vietnam. Meanwhile, cross-price elasticity shows that Indonesian coffee can dominate the market and plays an important role in determining market prices. This condition shows that Indonesia can improve the quality of the coffee it exports to the US. According to Hervinaldy, (2017) Improving the quality of coffee starts with selecting the best coffee seeds, maintaining coffee trees, selecting coffee cherries according to their level of maturity, drying the coffee beans, and applying certification to Indonesian coffee products. This will help strengthen the position of Indonesian coffee in the US market (Ginting et al., 2022; Haris et al., 2023).

Based on the explanation above, it can be seen that Indonesian coffee trade policies in the US market must consider two elements, namely price and quality. In terms of price, focus on controlling price competition for Indonesian coffee in the destination market because the value of Indonesian coffee is more responsive than the value of Vietnamese coffee based on its price elasticity value. The cross elasticity value shows that the US market, which is Indonesia's main coffee export destination, still has the opportunity to be more profitable for Indonesia. Indonesia can use this to increase its exports.

CONCLUSION

The results of the LA/AIDS show that demographic factors that influence demand for coffee in the US market for Indonesia include expenditure, Indonesian coffee prices, Indian coffee prices, GDP per capita, population, and unemployment rate. In Vietnam, factors that influence coffee demand include expenditure, GDP per capita, and population with a significance level of 5% each. Meanwhile, India only has one significant variable, which is the Indonesian coffee price. Expenditure elasticity shows that the United States market has a very large market opportunity because the market can be accessed easily, especially for Indonesia. All expenditure elasticity values have a positive sign (E>0), which means that coffee from each exporting country is a normal good for the US market. So, when the total value of US imports increases, demand for coffee from Indonesia, Vietnam, and India will increase. The price elasticity of coffee from Indonesia is inelastic in the US market because it shows a result of less than one ($\varepsilon < 1$), this means that changes do not influence changes in the quantity demanded of Indonesian coffee in its price in the US market. Apart from that, the cross-price elasticity of coffee in America shows that Indonesian coffee is related to Vietnamese coffee in a complementary way, while Vietnam is related to Indonesia in a substitute way and Indonesian coffee to India is related to each other in a complementary way.

The results show that coffee from Indonesia has market power if seen from the demand which does not change when the price in the US market changes. In addition, Indonesia's coffee export relations with Vietnam and India indicate a complementary rather than competitive relationship. This condition gives a signal that the US market is a potential main destination for Indonesia and can continue to be optimized.

Strategic steps can be taken to optimize Indonesian coffee exports to the US, that is:

1. The government through its policies encourages improvements in the quality

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i3.1822

and quantity of Indonesian coffee. This can be done by improving the quality of human resources, capital, science and technology. And it is important to develop advanced farmers as actors in the use of technological innovation in the field.

2. Exporters must start focusing on branding Indonesian coffee. With specialty coffee, Indonesia is more diverse than its competitors. So it is important to highlight Indonesia in detail as a coffee producer so that it is better known to world consumers.
3. Organize and attend international coffee events. As the largest coffee producer, Indonesia must always be present and introduce its superior products. This aims to increase the interest of US consumers as a strategic market, and also another country.
4. Farmers or producers can differentiate coffee products at the consumer level. The differentiation of Indonesian coffee products at the consumer level will reduce the number of its substitutes and at the same time will make the demand curve faced by Indonesian coffee producers more inelastic.
5. The cultivation calendar has the potential to be applied as a guide to coffee cultivation activities for farmers. Using a cultivation calendar can realize precision coffee farming where cultivation inputs are adjusted to phenological and environmental conditions. These efforts will help coffee farmers be more effective and efficient in producing good quality and quantity coffee.

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