

Global Market Position and Demand Elasticities of Indonesian Areca Nut: An AIDS Model Analysis

Silviony Futrinelsa^{1♥}, Suharno², and Anisa Dwi Utami²

¹Master of Science in Agribusiness, Department of Agribusiness, Faculty of Management and Economy, IPB University, Bogor, Indonesia

²Department of Agribusiness, Faculty of Management and Economy, IPB University, Bogor, Indonesia

♥Corresponding author email: silvionyfutrinelsa@apps.ipb.ac.id

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Abstract. This study aims to analyze the market position and competitiveness of Indonesian areca nut exports in the global market using the Almost Ideal Demand System (AIDS) model. Indonesia has remained the dominant exporter of areca nut globally, holding over 50% of the market share from 2012 to 2024. However, recent fluctuations in export value and competition from other major exporters such as Myanmar, Thailand, and India highlight the need for a deeper understanding of market dynamics. The analysis utilizes secondary data under HS Code 080280, spanning the 2012–2024 period, and employs the Seemingly Unrelated Regression (SUR) approach to estimate own-price, cross-price, and expenditure elasticities. Results indicate that Indonesia's areca nut exports are price inelastic, suggesting limited responsiveness to price changes. Cross-price elasticity values reveal complementary relationships with India and Myanmar, as well as a substitutive relationship with Thailand. Expenditure elasticity further classifies Indonesian areca nut as a normal good, in contrast to Thailand and Myanmar's luxury classification, and India's categorization as an inferior good. These findings provide critical insights for developing strategies to enhance the competitiveness and export performance of Indonesian areca nut in international markets.

Keywords: AIDS Model; areca nut; competitiveness; elasticity; international trade

INTRODUCTION

In 2023, the Directorate General of Plantations of the Ministry of Agriculture of the Republic of Indonesia released the National Non-Primary Commodity Statistics Book, which contains the latest data and information on plantation commodities not yet categorized as nationally superior. One of the commodities listed in the book is the areca nut (*Areca catechu*). The areca nut is a multifunctional plant that has long been known and utilized in Indonesian culture. This plant has benefits for both the consumption and industrial sectors. Traditionally, in Indonesia, areca nut is used as the main ingredient in the areca quid chewing tradition. This areca quid chewing tradition involves the use of areca nut along with areca leaves and is often considered a symbol of good manners in various social gatherings ([Rahmad and Umar 2024](#)). Boiled areca nut water is used in traditional medicine for cleaning and healing infected wounds (Oktafirnanda et al., 2022).

Indonesia's exports are supported by two main sectors: the oil and gas sector and the non-oil and gas sector, both of which positively impact the country's Gross Domestic Product (GDP). The non-oil and gas sector encompasses various products, including agriculture, plantations, fisheries, textiles, electronics, and other manufacturing sectors. Indonesia is an agrarian country with significant potential in the agricultural sector. In 2022, the agriculture, forestry, and fisheries sector contributed approximately 12.40% to the national Gross Domestic Product (GDP) ([Badan Pusat Statistik 2023](#)).

Agricultural exports not only positively impact GDP but also contribute to farmers by creating jobs. The plantation subsector contributes the largest share of GDP to other agricultural sectors. According to the Central Statistics Agency (2023), the plantation subsector's contribution to GDP reached 3.76% in 2022, with a trend of increasing growth each year. This figure illustrates the significant role the plantation subsector plays in supporting the national economy through

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the export of plantation commodities. While plantation commodity exports are dominated by primary commodities such as palm oil, rubber, coffee, and cocoa, exports of non-primary commodities also contribute to the GDP. Areca nut is one of the national non-primary commodities that also contributes to GDP.

International trade is a relationship between countries aimed at generating profits through exports (selling goods to other countries) and import needs (buying goods from other countries). This trade relationship occurs due to differences in production, technological capacity, and the global value chain. The Indonesian areca nut market in the international market currently faces various challenges in maintaining competitiveness and expanding market share. This is caused by several factors, including price fluctuations, dynamic global demand, and competition from other exporting countries such as Myanmar, India, and Thailand. Competitor countries act as downstream processors that utilize Indonesian areca nut as the main raw material for processing industries, such as supari (traditional chewing mix) consumer products, pharmaceutical

ingredients, cosmetics, and food and beverage additives. The areca nut trade chain reflects a form of vertical integration between countries, where raw areca nut exports from Indonesia serve as an important input for processing industries in trading partner countries.

According to [Trade Map data \(2025\)](#), Indonesia was the world's largest exporter of areca nut from 2012 to 2024, accounting for approximately 52 percent of the global market share. Market share refers to the percentage of a country's exports that contribute to the total world exports of a specific commodity. Myanmar ranked second with 14 percent, followed by Thailand in third place with 12 percent. Sri Lanka held the fourth position with 8 percent, while India and Singapore each contributed 4 percent. The remaining 6 percent came from other countries (Rest of the World/ROW) as shown in [Figure 1](#). These figures clearly demonstrate Indonesia's dominance in the global areca nut export market, as more than half of the world's areca nut exports originate from Indonesia. This competitive advantage positions Indonesia strategically in the international areca nut trade.

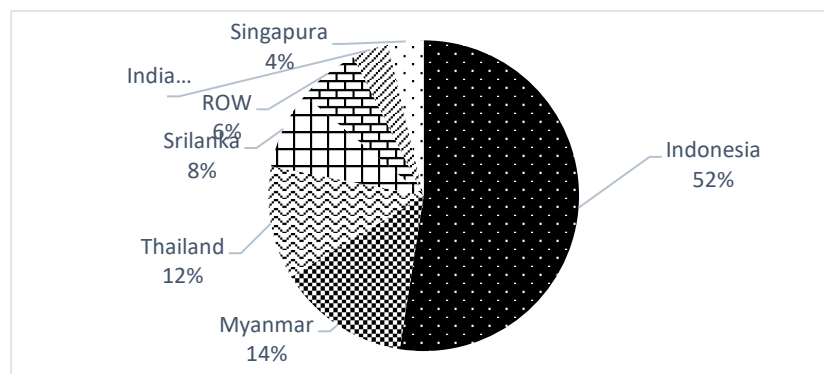


Figure 1. Percentage of Areca Nut Exporting Countries, 2012–2024
(Source: [International Trade Centre, 2025](#))

Based on export data from 2012 to 2025 ([Figure 2](#)), there has been a declining trend in the export value (in thousand USD) of Indonesian areca nut. The export value is calculated by multiplying the export volume by the price per unit of a commodity on the international market, despite reaching its

peak in certain years ([International Trade Centre, 2025](#)). This indicates significant challenges in maintaining Indonesia's competitiveness in the global areca nut market. Although there has been an increase in cultivation area and domestic production—evidenced by the expansion from 152,931

hectares in 2020 to 163,367 hectares in 2023—export performance has fluctuated and, in some years, even declined.

Areca nut is categorized as a non-priority national commodity in Indonesia; however, its export potential offers opportunities for broader market expansion. Realizing this potential requires enhancing competitiveness

to capture new markets, taking into account prevailing market conditions and the export performance of Indonesian areca nut. Evaluating export performance is essential to understanding trade fluctuations and analyzing competition among areca nut exporters in the international market.

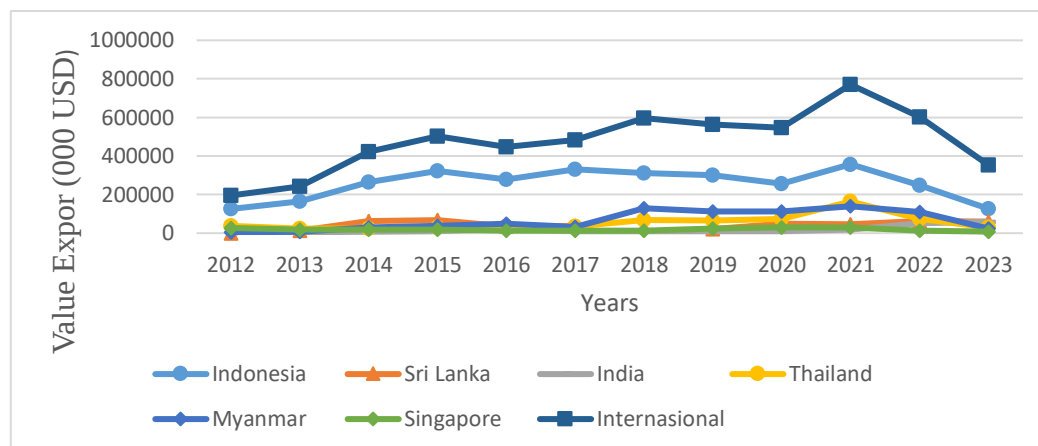


Figure 2. Global Areca Nut Export Value
([International Trade Centre, 2024](#))

Previous studies indicate that Indonesian areca nut has strong competitiveness, comparable to Thailand and Myanmar, while India's export competitiveness fluctuates and China's remains relatively weak ([Irwandi and Purwanti 2024](#)). Similarly, areca nuts from Jambi Province demonstrate strong competitiveness, with the province recording its highest export value in 2010, signifying a comparative advantage ([Dasa et al. 2017](#)). In India, the main export destination for areca nut, Indonesia's position is surpassed by Myanmar, which holds a more dominant comparative advantage (Marinda et al., 2024). Related research on the dynamics of plantation export performance, particularly Indonesian spices, by [Nurhayati et al. \(2019\)](#) and [Tri et al. \(2016\)](#) has shown that Indonesian spices possess high competitiveness and strong comparative advantages in the international market, reflected in market positions such as *Lost Opportunity*, *Rising Star*, *Retreat*, and *Falling Star*.

However, research focusing specifically on the demand for areca nut, especially regarding price elasticity and expenditure elasticity, remains scarce, highlighting the need for further investigation. Elasticity is a measure used in economics to indicate how much a variable changes in response to changes in another variable. In this context, stakeholders in the areca nut industry must develop a comprehensive understanding of global market dynamics, including consumption trends and consumer preferences in target countries. Such insights are crucial for ensuring that export activities are both efficient and effective, and for enabling government and private sector actors to develop strategies and policies tailored to new market entry. Furthermore, to elevate areca nut to the status of a priority commodity, coordinated strategic measures across production, marketing, and policy domains are required. Therefore, further research is warranted to identify and evaluate strategies that can increase demand and

strengthen the market position of Indonesian areca nut in the global marketplace.

METHODS

Types and Sources of Data

This study utilizes secondary data classified under HS code: 080280 – Areca nut, fresh or dried. This code refers to areca nut commodities, both fresh and dried, which are among Indonesia's key export products with high demand in international markets. The focus of this research is on the dynamics of Indonesia's areca nut export competitiveness and its demand, particularly in global markets that include major importing countries. The study employs time series data covering the period from 2012 to 2024, and these data were obtained and processed using Stata MP version 17. The data used will be taken from the ITC Trade Map, UN Comtrade, BPS, and the Ministry of Agriculture (KEMENTAN).

Data Analysis Method

The Almost Ideal Demand System (AIDS) method is used to analyze a country's competitiveness by estimating cross-price elasticity, own-price elasticity, and expenditure elasticity (Wan et al., 2010). In this study, the AIDS model is applied to evaluate the international market position of Indonesian areca nut by estimating expenditure elasticity, cross-price elasticity, and own-price elasticity. This approach enables a more accurate analysis of the demand system for areca nut in the global market by taking into account the interrelationship between income, prices, and consumption levels. Moreover, the model illustrates the competitive dynamics between Indonesia and its major exporting competitors—namely Thailand, Myanmar, and India in the global areca nut trade.

To estimate this demand system, the Seemingly Unrelated Regression (SUR) method is employed, which enables more efficient estimation of the demand equations by accounting for the correlation of error terms across the equations. This approach not only improves the accuracy of the analysis

but also enhances its robustness in addressing heteroskedasticity issues commonly found in economic data. Furthermore, the SUR method ensures that the estimations comply with key economic principles such as adding-up, homogeneity, and symmetry, which are essential assumptions of the AIDS model. Therefore, the use of this method provides more valid elasticity estimates that can serve as a foundation for formulating effective trade policies for Indonesian areca nut in the global market.

In the AIDS model, the SUR formulation can be expressed as follow [Equations 1](#):

$$W_i = \alpha_i + \sum_{j=1}^n Y_{ij} \log P_j + \beta_i \ln \frac{x}{p^*} \dots 1$$

Where:

W_i = the market share of Indonesian areca nut exports in the international market

P = the price from the exporting country

X = total import value

P^* = Stone's geometric price index = $\sum w_i \cdot p_i$

α, γ, β = regression parameters

The AIDS model has a significant advantage in that it allows for structural estimation while incorporating essential economic restrictions such as homogeneity and symmetry, and simultaneously satisfying the adding-up condition. These restrictions are implemented in accordance with the foundational structure of the AIDS model, which encompasses various interrelated demand functions. The following are the standard restrictions applied in the AIDS model:

a. Adding-up

The total expenditure across all demand functions must be equal to the total income or budget. The adding-up condition can be observed in [Equation 2](#)

$$\sum_{i=1}^n \alpha_i = 1, \quad \sum_{i=1}^n \gamma_{ij} = 0, \quad \sum_{i=1}^n \beta_i = 0 \quad \dots 2$$

b. Homogeneity

Homogeneity is a condition that ensures the demand for a commodity remains unchanged when there is a proportional change in both income and prices. This results directly from

the property of demand functions being homogeneous of degree zero with respect to prices and income. Homogeneity can be observed in [Equation 3](#) :

$$\sum_{i=1}^n \gamma_{ij} = 0 \quad \dots 3$$

c. Symmetry

The symmetry condition implies that the cross-price effects in demand responses are symmetric; that is, the effect of a price change in one good on the demand for another good is equal to the reverse effect. The symmetry restriction, which ensures that the cross-price effects between commodities are equal, is presented in [Equation 4](#) :

$$\gamma_{ij} = \gamma_{ji} \quad \dots 4$$

The SUR results can be further processed to calculate the cross-price elasticity, which reflects the competitive relationship between Indonesian areca nut and other exporting countries such as Thailand, Myanmar, and India. In addition, the own-price elasticity and expenditure elasticity can also be derived. The following are the formulas used to compute these elasticities:

1. Own-Price Elasticity (Uncompensated)

Own-Price Elasticity is a measure that describes the extent to which the quantity demanded of a good responds to a change in price. This elasticity is calculated as the percentage change in quantity demanded divided by the percentage change in price ([Baye and Prince, 2022; Harianto et al., 2022](#)). The formula for the uncompensated own-price elasticity is presented in [Equation 5](#).

$$e_{ij} = -\delta + \frac{\gamma_{ii}}{w_i} - \beta_i \left(\frac{w_j}{w_i} \right) \quad \dots 5$$

e_{ij} = Price elasticity of demand

γ_{ij} = Parameter of the price of areca nut in market j

β_i = Total export value of areca nut in market j

w_i = Market share of areca nut from country i

w_j = Market share of areca nut from country j

Own-Price Elasticity typically negative, reflecting the inverse relationship between price and quantity demanded. It can be classified into three categories:

- $E_p > 1$ indicates elastic demand, where the percentage change in quantity demanded exceeds the percentage change in price;
- $E_p = 1$ reflects unitary elasticity, where both changes are equal;
- $E_p < 1$ denotes inelastic demand, where the quantity change is smaller than the price change.

2. Cross-Price Elasticity (Compensated)

Cross-Price Elasticity measures how a change in the price of one product affects the demand for another. It is calculated as the percentage change in the quantity demanded of the second good divided by the percentage change in the price of the first ([Baye & Prince, 2022; Harianto et al., 2022](#)). The formula for the compensated cross-price elasticity is presented in [Equation 6](#).

$$e^*_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} - w_j \quad \dots 6$$

e^*_{ij} = cross-price elasticity

γ_{ij} = price parameter of areca nut in market j

w_i = market share of areca nut from country i

w_j = market share of areca nut from country j

δ is the Kronecker delta, where $\delta = 1$ if $i = j$, and $\delta = 0$ if $i \neq j$

The classification of cross-price elasticity values is as follows:

- $E_{xy} > 0$ indicates a substitute relationship, meaning the two products can replace each other.
- $E_{xy} < 0$ indicates a complementary relationship, meaning the products are used together or support each other.

3. Expenditure Elasticity

Expenditure elasticity measures how sensitive the quantity demanded of a product is to changes in consumer income. It is calculated as the percentage change in quantity demanded divided by the percentage

change in income ([Baye & Prince, 2022](#); [Harianto et al. 2022](#)). The formula for the expenditure elasticity is presented in [Equation 7](#)

$$\eta_i = 1 + \frac{\beta_i}{w_i} \dots 7$$

η_i = income elasticity

β_i = total export value of essential oil in market j

W_i = market share of country i

Income elasticity values are interpreted as follows:

- a. **EI > 0** indicates a **normal good**, meaning demand increases as consumer income rises.
- b. **EI < 0** indicates an **inferior good**, where demand decreases when income increases.

RESULTS AND DISCUSSION

Indonesian areca nut products are known for their superior characteristics, including uniform seed size, high tannin content, and low contamination levels, which are competitive advantages in the export market ([Irwandi and Purwanti 2024](#)). Despite its high competitiveness, Indonesia faces obstacles in exporting areca nut, particularly to India, its largest export market. India implements strong protectionist policies to protect its areca nut farmers, making Indonesian areca nut exports to that country still difficult ([Antaranews 2023](#)). In addition, the implementation of a minimum import price (MPI) policy in India, as well as high import duties in countries such as India, Iran, and the UAE, also pose major challenges to Indonesian areca nut exports. These obstacles put pressure on the competitiveness of Indonesian areca nut in the international market, although Indonesian areca nut products remain superior in terms of quality and distribution ([Irwandi and Purwanti 2024](#)).

Indonesia has significant potential as one of the world's leading areca nut producers, although there is still room for optimization to increase competitiveness through

innovation, product diversification, and expanding international market access. In line with research by [Pohan et al. \(2023\)](#), which highlights the competitiveness of spice commodities such as ginger, strategies for improving product quality, distribution efficiency, and market diversification are crucial for maintaining and enhancing the competitiveness of Indonesian areca nuts. Increasing productivity through expanding planting areas and improving post-harvest technology can also contribute to the competitiveness of Indonesian areca nuts in the international market. External factors, such as international trade policies and global market dynamics, significantly influence Indonesia's export competitiveness (Anwar et al., 2020).

This study has limitations, including limited data, which poses a major challenge because export prices are estimated using unit value prices as a proxy for actual prices, potentially leading to bias due to variations in quality between countries. The possibility of omitted variables, such as the influence of the Minimum Price Import (MPI) policy in India, import duties, and exchange rate fluctuations, which are not explicitly included in the model, and the potential for endogeneity between export prices and volumes that can affect the accuracy of elasticity estimates.

The results of the analysis using the AIDS model identify the level of competition between the world's areca nut exporting countries, namely Indonesia, Thailand, Myanmar, and India. Areca nut as one of the ingredients of the cosmetic and pharmaceutical industries. Plays an important role in meeting the global market. The content of active ingredients in areca nut, such as alkaloids and tannins, makes it have antibacterial and anti-inflammatory properties ([Sandhiutami et al. 2023](#)). Due to the growing demand for areca nut in the global market, there is fierce competition between countries in the main exporting markets. The results of the AIDS model analysis in the table for Indonesia, Thailand, Myanmar, and India at a significance level of

1 percent ($\alpha = 0.01$) indicate that the independent variables together can explain the related variables, namely the market share

of Indonesia, Thailand, India, and Myanmar in the global market.

Table 1. Coefficient Values And P-Value Of Market Share Of Demand For Indonesian Areca Nut Exports In The Global Market

Equality	R-Squared	P-Value
Indonesian	0.3116	0.0000
Thailand	0.1027	0.0043
Indian	0.2134	0.0000
Myanmar	0.3459	0.0000

Source: processed 2025

The R-squared values in [Table 1](#) indicate that the proportion of variation in the share of areca nut exports in several countries can be partially explained by the independent variables in the model, while the remainder is influenced by other factors outside the model. For Indonesia, Thailand, India, and Myanmar, the R-squared values each indicate the contribution of the variables in the model to the variation in areca nut exports.

Indonesia has an R-squared of 0.3116, meaning that approximately 31.16 percent of the variation in areca nut exports can be explained by factors in the model. This indicates that although the model is quite informative, most of the variation (68.84 percent) is influenced by external factors such as changes in trade policy, consumer preferences, or supply chain disruptions ([Leamer and Stern 2006](#); [Fuchs et al. 2014](#)).

Table 2. Value Of The Export Market Share Of Indonesian, Thai, Indian And Myanmar Areca Nuts In The Global Market 2012 – 2024

Years	Value Of The Export Market Shere Areca Nut (%)				
	Indonesian	Thailand	Indian	Myanmar	ROW
2012	0.646	0.188	-	0.026	0.140
2013	0.718	0.105	0.021	0.042	0.114
2014	0.754	0.067	0.026	0.083	0.070
2015	0.760	0.068	0.026	0.092	0.054
2016	0.688	0.081	0.060	0.127	0.043
2017	0.769	0.085	0.025	0.080	0.041
2018	0.569	0.126	0.017	0.243	0.046
2019	0.591	0.128	0.019	0.206	0.056
2020	0.560	0.152	0.023	0.186	0.080
2021	0.516	0.232	0.030	0.166	0.056
2022	0.425	0.120	0.106	0.172	0.178
2023	0.388	0.081	0.163	0.107	0.261
2024	0.384	0.176	0.055	0.151	0.235
Rata – rata	0.598	0.124	0.044	0.129	0.106

Source: processed (2025)

The average market share of areca nut exports in the global market, as shown in [Table 2](#), indicates that Indonesia is the largest exporter, with a market share of 59.8 percent

during the period 2012–2024, demonstrating its dominant role in the global areca nut trade. In second place is Myanmar, with a market share of 14.1 percent, indicating that it also

plays a significant role in areca nut exports, although its contribution is smaller compared to Indonesia. Meanwhile, Thailand ranks third with a 12.9 percent share, and India records a relatively small market share of only 4.4 percent, indicating its limited contribution to the global areca nut market. Other countries, categorized as the Rest of the World (ROW), contribute 1.06 percent to total areca nut exports.

Indonesia's market share in areca nut exports is the highest among its competitors. However, Indonesia's dominance in the international areca nut export sector has been declining annually, from 76 percent in 2015 to only 38.8 percent in 2024. In contrast, competitors such as Myanmar have experienced growth in their international areca nut export market share, rising from just 2 percent in 2012 to 15.2 percent in 2024 (Table 2). The yearly fluctuations in Indonesia's market share are partly due to shifts in market segments based on consumer preferences and competitor pricing. This is in line with the findings of Forgenie et al. (2024), which state that exports can shift due to consumer preferences and competitor prices.

Indonesia must remain vigilant toward its competitors as their export contributions continue to grow, making the market increasingly competitive. This is a concern because price fluctuations, product quality, and trade policies implemented by these countries can affect Indonesia's position in the global market. According to Fitriyani et al. (2024), international trade policies directly influence the competitiveness of Indonesian agricultural products in the global market. Furthermore, strategies are needed to maintain market share through improvements in product quality and service (Heriqbaldi et al., 2023). Own-price elasticity measures the magnitude of the change in the quantity of goods demanded when the price changes. An own-price elasticity value greater than or equal to 1 ($\epsilon \geq |1|$) indicates that areca nuts are price elastic, whereas a value less than 1 ($\epsilon < |1|$) indicates that areca nuts are price inelastic (Mankiw, 2023). The following are the results of the demand elasticity for areca nuts in the global market from 2012 to 2024. The own-price elasticities of areca nut demand for Indonesia, Thailand, Myanmar, and India are presented in the table below.

Table 3. Price Elasticity Values of Areca Nuts in Indonesia, Thailand, Myanmar, and India

Country	Price Elasticity Values
Indonesian	-0.587
Thailand	-1.197
Indian	-0.882
Myanmar	-1.093

Source: processed (2025)

Table 3 presents the results own-price elasticity of areca nut exports in the markets of Indonesia, Thailand, India, and Myanmar, all of which have negative values. The negative values indicate that an increase in the price of areca nuts from these four major exporters will lead to a decrease in the quantity demanded. This condition is consistent with demand theory, which states that when the price of a good or service increases, the quantity demanded tends to decrease, and conversely, when the price decreases, the quantity demanded tends to

increase (Mankiw, 2023). In this theory, some products are classified as price elastic or inelastic. Elastic products are highly responsive to price changes, while inelastic products are less affected by such changes.

The own-price elasticity values of areca nut exports from Indonesia, India, Thailand, and Myanmar indicate varying levels of demand sensitivity to price changes. Indonesia has an elasticity value of -0.587, meaning that a 1 percent increase in the price

of Indonesian areca nuts will decrease demand by 0.587 percent. This value reflects that Indonesian areca nuts in the global market are inelastic, or not highly sensitive to price changes. This finding is in line with the study [by Satari Yuzbashkandi and Mehrjo \(2020\)](#), which found that the agricultural sector in Iran is categorized as inelastic, indicating that price changes still influence demand. For inelastic goods such as areca nuts, export growth can be achieved by increasing the volume or quantity exported, rather than lowering prices or offering discounts ([Rifin, 2013](#)).

Because demand for Indonesian areca nut is inelastic, the appropriate policy is to focus on increasing export volume rather than lowering prices. The government can encourage increased productivity by expanding planted areas, improving cultivation and post-harvest technology, and increasing supply chain efficiency in production centers such as Jambi, Aceh, and West Sumatra. By ensuring a stable supply and consistent product quality, Indonesia can increase export volume and strengthen its position in the global market without relying on price fluctuations as its primary strategy.

India has an elasticity value of -0.882. The demand for areca nuts from India is less sensitive to price due to the high quality of the nuts produced. On the other hand, Thailand shows the highest own-price elasticity at -1.197, indicating that the demand for Thai

areca nuts is highly elastic—every 1 percent price increase results in a 1.197 percent decrease in demand. Consumers of Thai areca nuts are very responsive to price changes. Myanmar also shows high elasticity, with a value of -1.093, meaning demand will decrease by 1.093 percent if prices rise by 1 percent. These differences in own-price elasticity are influenced by the purchasing behavior of importing countries, which affects how they respond to price changes ([Ximenes et al., 2022](#)). Consumers of Indonesian and Indian areca nuts prioritize availability and quality over price.

The estimation results of cross-price elasticity explain the relationship between areca nut exports from Indonesia, Thailand, India, and Myanmar in the global market. The cross-price elasticity values indicate the extent to which the demand for areca nuts from one country changes when the price of areca nuts from another exporting country changes.

These elasticity values indicate whether the relationships between countries are substitutive or complementary. As stated by [Mankiw \(2023\)](#), two goods are considered substitutes if an increase in the price of one good leads to an increase in the demand for the other (positive cross-price elasticity), whereas two goods are considered complements if an increase in the price of one good leads to a decrease in the demand for the other (negative cross-price elasticity).

Table 4. Cross-Price Elasticity of Areca Nuts in Indonesia, Thailand, India, and Myanmar

	Indonesian	Thailand	Indian	Myanmar
Indonesian	-	0.111	-0.048	-0.298
Thailand	0.556	-	0.425	0.285
Indian	-0.589	1.038	-	0.130
Myanmar	-1.251	0.240	0.045	-

Source: processed 2025

The relationship between Indonesian areca nuts and those from India and Myanmar ([Table 4](#)) shows a complementary nature, as indicated by the negative cross-price elasticity values of -0.048 and -0.298. This means that when the price of areca nuts from

India or Myanmar increases, the demand for Indonesian areca nuts decreases. For example, if the price of Myanmar's areca nuts increases by 10 percent (*ceteris paribus*), the demand for Indonesian areca nuts will fall by 2.98 percent. This suggests that areca nut

products from these countries may be used together in certain consumption or industrial contexts and are not substitutes for each other. Therefore, there is no direct competition between Indonesian areca nuts and those from India or Myanmar in the global market.

The findings regarding the complementary relationship between Indonesian betel nut and those from India and Myanmar can be explained by differences in product segments and quality used simultaneously in the manufacturing process. For example, the pharmaceutical and cosmetics industries in importing countries may utilize Indonesian betel nut for its high-quality tannin extract, while Indian betel nut is used as an additive with specific characteristics. This creates a complementary relationship based on production functions, rather than direct substitution in the end market. To confirm this hypothesis, further research is needed to conduct additional tests such as analyzing the composition of export value by product type (whole, split, dried, extract) and mapping cross-country supply chains to identify product usage linkages. This approach will clarify the economic mechanisms behind the complementary relationship between countries and strengthen the theoretical basis of the research findings.

The relationship between Indonesian and Thai areca nuts, on the other hand, is substitutive, with a cross-price elasticity value of 0.111. Although this value is

relatively low, it indicates a shift in demand from Thai products to Indonesian products when the price of Thai areca nuts rises. If the price of Thai areca nuts increases by 10 percent, the demand for Indonesian areca nuts is expected to rise by 1.11 percent. This relationship reflects potential competition between Indonesia and Thailand in the areca nut export market. This aligns with the fact that Thailand's areca nut exports account for 12 percent of the global areca nut market ([ITC Trade Map, 2025](#)). Therefore, Indonesia should closely monitor price dynamics of Thai areca nuts to anticipate potential shifts in international market preferences.

These findings are consistent with the concept of cross-price elasticity explained by [Mankiw \(2023\)](#), in which a positive relationship reflects substitute goods and a negative relationship reflects complementary goods. The differences in cross-price elasticity values indicating substitution or complementarity also depend on the market share held by the exporting country of a particular commodity ([Forgenie et al., 2024](#)).

Expenditure elasticity is used to measure the responsiveness of demand to changes in consumer income. According to microeconomic theory as stated by [Mankiw \(2023\)](#), if the expenditure elasticity value is positive, the good is classified as a normal good—meaning that its demand increases as income rises. Conversely, if the value is negative, the good is classified as an inferior good—meaning that its demand decreases when consumer income increases.

Table 5. Elasticity of Expenditure on Areca Nut Commodities in Indonesia, Thailand, India, and Myanmar

Country	Elasticity of Expenditure
Indonesian	0,852
Thailand	2,056
Indian	-1,450
Myanmar	3,092

Sumber : diolah (2025)

The calculations in [Table 5](#) show that Indonesian areca nuts have an expenditure

elasticity value of 0.852, indicating that they are classified as normal goods. This means

that a 10 percent increase in consumer income will increase the demand for Indonesian areca nuts by 8.52 percent (*ceteris paribus*). An elasticity value below one also indicates that Indonesian areca nuts fall into the category of necessity goods, where the increase in consumer spending on areca nuts is relatively smaller than the increase in income (Zhu, 2023).

In contrast, areca nuts from Thailand and Myanmar have expenditure elasticity values of 2.056 and 3.092, respectively, suggesting that areca nuts from these two countries are classified as luxury goods. Therefore, if consumer income rises by 10 percent, the demand for Thai and Myanmar areca nuts is expected to increase by 20.56 percent and 30.92 percent, respectively. This reflects the perception in the international market that areca nut products from Thailand and Myanmar have higher value or quality and are more preferred when purchasing power increases.

Meanwhile, Indian areca nuts show an expenditure elasticity value of -1.450 , indicating that they are classified as inferior goods. This means that when consumer income increases, the demand for Indian areca nuts will decline. This condition suggests a shift in demand patterns as consumer income rises. As an areca nut-importing country, India prioritizes meeting domestic needs before engaging in exports. Although areca nut production in India has increased, the country still requires imports to cover supply shortages (Kumari, 2023).

Future research could utilize cross-country and time-spanned panel data to obtain more robust results and account for heterogeneous effects across exporting countries. Further research could also combine microeconomic approaches with buyer- or firm-level data to more accurately assess price responses. Furthermore, supply-side analysis is needed to understand the productivity factors, logistics costs, and supply chain efficiency that influence the competitiveness of areca nut exports. Experimental studies, such as simulating

changes in export-import prices or tariffs, could also be used to evaluate market sensitivity to specific trade policies. Thus, future research findings are expected to provide a stronger empirical foundation for formulating sustainable export policies.

CONCLUSION

The price elasticity of Indonesian areca nut is negative, indicating that demand for Indonesian areca nut is inelastic to price changes. This implies that even if the price of Indonesian areca nut increases, the decrease in demand is not significant, so a strategy of increasing export volume is more effective than a price reduction. This estimation result is statistically significant at the 99% confidence level ($\alpha = 0.01$), indicating that the model has a high degree of confidence in explaining the relationship between price and demand. Economically, this finding is consistent with the theory of demand for primary commodities, which tends to be price inelastic. However, there is a margin of error stemming from data limitations, such as the use of unit value price as a proxy for actual price, which can introduce bias due to differences in quality between countries, as well as potential omitted variables such as the influence of India's Minimum Price Import (MPI) policy, import tariffs, and exchange rate fluctuations. Furthermore, the possibility of endogeneity between price and export volume can also affect the accuracy of elasticity estimates.

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