

# The Impact of ASEAN-India Free Trade Agreement on Palm Oil Export Performance: A Comparative Study of ASEAN-3

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## Abstract

India is the world's largest importer of palm oil, with a significant share sourced from ASEAN-3 countries – Indonesia, Malaysia, and Thailand. The ASEAN-India Free Trade Agreement (AIFTA), implemented in 2010, aimed to strengthen trade ties by reducing tariffs on palm oil. However, previous studies have produced mixed results regarding AIFTA's effectiveness, highlighting the need for further analysis. This study examined the impact of AIFTA on the palm oil export performance of ASEAN-3 countries by evaluating their competitiveness in the Indian market using Revealed Comparative Advantage (RCA), Export Product Dynamics (EPD), and Ordinary Least Squares (OLS) gravity models. Utilizing secondary data from 2007 to 2021 sourced from UN Comtrade, the World Bank, and CEPII, the study assessed competitiveness, identified export trends, and explored trade creation and diversion effects. Findings from the RCA and EPD

analyses indicate declining competitiveness for Indonesia and Malaysia, while Thailand shows notable improvement. Despite tariff concessions under AIFTA, the gravity model reveals no significant trade creation effect, suggesting that non-tariff factors—such as India’s domestic production policies, export duties, and geographic proximity—play a more influential role. The study concludes that AIFTA’s impact on the palm oil trade remains limited. To enhance export performance, ASEAN-3 countries must pursue product diversification, sustainability initiatives, and strategic trade reforms. These insights offer valuable guidance for policymakers aiming to optimize FTA outcomes and navigate evolving market dynamics.

**Keywords:** AIFTA, gravity model, palm oil

## Introduction

India holds the position of being the world’s largest importer of palm oil, with significant imports recorded in 2021. Crude palm oil (HS code 151110) accounted for USD 8,317 million, representing 52 percent of the total imports. In contrast, other palm oil (HS code 151190) amounted to USD 1,251 million, accounting for 4 percent of the total imports. Among the exporting countries, Indonesia, Malaysia, and Thailand, collectively known as the ASEAN-3 countries, dominate the palm oil market in India. They hold a substantial market share, accounting for 92 percent of HS code 151110 and 75 percent of HS code 151190 (International Trade Centre, n.d.-b, n.d.-c).

The ASEAN-3 countries have established themselves as key suppliers of palm oil to meet India’s growing demand. With the signing of the ASEAN-India Free Trade Agreement (AIFTA) in 2009 and its implementation in 2010, the import duties on palm oil from ASEAN-3 countries have gradually decreased from 80 percent and 90 percent (based on the 2007 Most Favored Nation base rate) to 37.5 percent and 45 percent for HS codes 151110 and 151190, respectively. The tariff reduction is expected to have a positive impact on palm oil exports from ASEAN-3 countries to India. However, a study by Glorius et al. (2021) finds that Indonesia’s membership in AIFTA does not have a significant impact on Indonesian palm oil exports. On the other hand, Lakshmi et al. (2024), who examine the overall impact of AIFTA on the export performance of ASEAN-3 countries, discover a positive and significant effect on the palm oil trade between ASEAN member countries and India, indicating trade creation effects.

The two aforementioned studies used the gravity model approach but reached different conclusions when presented in aggregate and disaggregate form. This discrepancy is influenced by multiple factors that affect the impact of a Free Trade Agreement (FTA), including the size of the economy or gross domestic product (GDP), geographical distance (Ramaswamy et al., 2021), language used (Su et al., 2023; Yamanouchi, 2019), historical relationships (Yamanouchi, 2019), infrastructure, and border waiting times (Ijirshar, 2022;

Mao et al., 2024). Furthermore, the competitiveness of a country's industry (Cho & Choi, 2025), the strength and readiness of the national industry to compete with industries from other countries in the resulting free market, also determine the extent of the impact of an FTA.

Against this background, the present study aims to assess and compare the impact of the AIFTA on palm oil export performance in each of the ASEAN-3 countries. To achieve this, the study applies the OLS approach, complemented by the Revealed Comparative Advantage (RCA) and Export Product Dynamic (EPD) methods. By integrating the RCA and EPD approaches within the context of AIFTA, this research aims to address the existing research gap, which has hitherto predominantly relied on gravity model analysis when examining the impact of AIFTA. Given that over a decade has elapsed since the implementation of AIFTA and considering the substantial role of palm oil as a key export product for ASEAN-3 countries, this study aims to provide deeper insights into the impact of AIFTA on the palm oil sector.

Ultimately, the findings of this research are expected to serve as a foundation for government policies concerning the development of trade and industry sectors in the ASEAN-3 countries particularly within the palm oil sector, which is a commodity selected for its status as the primary driver of the trade balance between India and the ASEAN-3 (International Trade Centre, n.d.-b, n.d.-c). While this study provides a regional analytical framework, its findings necessitate country-specific policy applications. Indonesia and Malaysia must prioritize downstream industrialization to mitigate declining competitiveness (Husin et al., 2023), whereas Thailand's trends suggest a need for scaling strategies to leverage its emerging comparative advantage (Sowcharoensuk, 2022). Furthermore, this research identifies a structural tension between AIFTA's liberalization objectives and India's domestic import substitution policies, such as the National Mission on Edible Oils – Oil Palm (NMEO-OP) which was launched in 2021. To reconcile these conflicts, it is proposed that ASEAN-3 nations shift from tariff-focused negotiations toward advocating for the institutionalization of sustainability certifications, especially the Indonesian Sustainable Palm Oil (ISPO) and Malaysian Sustainable Palm Oil (MSPO) standards within the AIFTA framework, thereby aligning export strategies with India's evolving environmental and food security priorities. This becomes particularly relevant in light of the global competition within the palm oil trade. By enhancing our understanding of the impact of AIFTA, this study strives to contribute to informed decision-making and facilitate the formulation of effective strategies in this crucial sector.

## Literature Review

International trade constitutes a significant aspect of economic relations between countries. This is based on Ricardo's comparative advantage theory in *Principles of Political Economy and Taxation*, which state that international trade is shaped by disparities in technology, labor productivity, and production costs across sectors in different countries (Kanupriya, 2025). Thus, a country can benefit from international trade by specializing in the production of goods with lower opportunity costs across sectors rather than other countries.

In the context of ASEAN-3 (Indonesia, Malaysia, and Thailand), a country may enjoy a comparative advantage in palm oil production due to abundant natural resources, a suitable tropical climate, and a skilled labor force in the agribusiness sector. These advantages contribute to the prominence of the ASEAN-3 in the global palm oil market, which is experiencing a rise in demand, particularly in developing countries such as India. This is reflected in the high level of palm oil production in ASEAN-3 countries (Food and Agriculture Organization, 2023). As a result, the ASEAN-3 countries have emerged as dominant actors in the global palm oil market, supplying a substantial share of international demand, particularly in rapidly growing developing economies such as India.

Despite the multilateral trade liberalization framework established under the World Trade Organization (WTO), many countries continue to pursue regional and bilateral trade agreements to deepen economic integration (Fontagne et al., 2023; Obradovic, 2012). Furthermore, FTA elucidates the advantages of eliminating trade impediments between nations, thereby stimulating the circulation of commodities, services, and investment capital. The AIFTA represents a significant step towards enhancing economic relations between the member states of the Association of Southeast Asian Nations (ASEAN) and India (ASEAN, 2012). Preferential trade agreements such as the AIFTA allow participating countries to reduce tariffs and non-tariff barriers more extensively and more rapidly than what is typically achieved under the WTO framework. From an economic perspective, such agreements are often motivated by the desire to strengthen regional supply chains, improve market access, and enhance trade competitiveness in strategic sectors (Dixon et al., 2018). The elimination or reduction of tariffs on a range of commodities, including palm oil, offers the ASEAN-3 the opportunity to enhance the competitiveness of their products in the Indian market. The AIFTA enables the ASEAN-3 countries to access the Indian market at a reduced cost, thereby expanding export potential and reducing dependence on other traditional markets (Sudan, 2022).

The effects of the FTA can be observed through two principal mechanisms, namely trade creation and trade diversion. The phenomenon of trade creation occurs when the removal of trade barriers allows a country to import goods from other countries that are more efficient than domestic production. Conversely, trade diversion occurs when trade is diverted from more efficient producers outside the FTA region to producers within the region who benefit more from tariff removal. With AIFTA, it is anticipated that tariffs on palm oil will be reduced, creating new trade opportunities that may increase export volumes from ASEAN-3 to India (Das & Borkakoty, 2022; Glorius et al., 2021). Furthermore, the impact of such trade may afford ASEAN-3 a competitive advantage over palm oil exporters from outside the region, such as those in South America. In the context of AIFTA, tariff reductions on palm oil products potentially facilitate increased exports from ASEAN-3 countries to India by lowering market entry costs and improving price competitiveness (Das & Borkakoty, 2022). However, some studies argue that preferential agreements can also generate trade diversion effects by favoring member countries over potentially more efficient global suppliers (Ornelas et al., 2021). Therefore, evaluating the net trade impact of AIFTA requires empirical analysis of export performance and competitiveness.

A country's competitiveness in international markets is influenced by a number of factors, including quality, product pricing, production process efficiency, company strategy, and government policy. The ASEAN-3 countries have a competitive advantage in palm oil production due to their efficient production costs and proactive export policies. ASEAN-3 countries also account for a significant share of global palm oil production (Food and Agriculture Organization, 2023). However, this competitiveness is also affected by several challenges, including fluctuations in international palm oil prices, pressure from trade protection policies in destination countries, and environmental issues associated with palm oil production. In particular, sustainability concerns and protectionist policies in some importing markets have introduced additional complexities for palm oil exporters.

The performance of ASEAN-3 palm oil exports to India can be seen in terms of export volume, export value, market share in India, and tariff reductions under AIFTA. The performance of ASEAN-3 palm oil exports to India is influenced by a number of factors, both internal and external. Internal factors include the productivity and efficiency of the palm oil sector. In contrast, external factors include the level of demand for palm oil in India and trade policies enacted by the Indian government. With AIFTA, it is anticipated that palm oil exports from ASEAN-3 to India will increase, supported by tariff reductions that will make the product more competitive in comparison to producers outside the region. However, the magnitude of these effects may vary depending on domestic production capacity, international demand conditions, and policy changes in importing countries. Therefore, analyzing export competitiveness and trade dynamics under AIFTA is essential to understand the evolving role of ASEAN-3 in the Indian palm oil market. India represents one of the largest vegetable oil importers in the world, with palm oil accounting for a significant share of its total edible oil consumption. Rapid population growth, urbanization, and rising income have substantially increased India's demand for edible oils, while domestic production remains insufficient to meet national consumption needs. Consequently, India relies heavily on imports from major producers such as Indonesia and Malaysia, making it a strategically important market for ASEAN palm oil exporters (Irshad et al., 2025).

## **Research Method**

This study uses secondary data on palm oil export data (HS codes 151110 and 151190), GDP, population, exchange rates, and economic distance from ASEAN-3, collected from various sources such as UN Comtrade, the World Bank, and CEPII (see Table 1). The data covers 15 years from 2007 to 2021, encompassing the years before and after the implementation of the AIFTA in 2010. This timeframe enables a comprehensive analysis of the impact of the agreement. The collected data will be analyzed within the framework of macroeconomics using various methods to address the research objectives.

Table 1. Data sources

Variable	Description	Source	Website
Palm oil exports (HS 151110 and HS 151190)	Export value (USD)	UN Comtrade	<a href="https://comtrade.un.org">https://comtrade.un.org</a>
Gross Domestic Product (GDP)	Current USD	World Bank	<a href="https://data.worldbank.org">https://data.worldbank.org</a>
Population	Total population	World Bank	<a href="https://data.worldbank.org">https://data.worldbank.org</a>
Exchange rate	Official Exchange Rate (LCU/USD)	World Bank	<a href="https://data.worldbank.org">https://data.worldbank.org</a>
Economic distance	Bilateral distance (km)	CEPII	<a href="http://www.cepii.fr">http://www.cepii.fr</a>

The first method employed is the Revealed Comparative Advantage (RCA) method, introduced by Balassa (1965) to assess a country’s competitiveness in the global market. This method compares a country’s export share of a commodity to the global export share of that commodity. RCA plays a crucial role in evaluating a country’s position in international trade. A high RCA value indicates a comparative advantage in producing and exporting a specific commodity, while a low RCA value suggests a lack of comparative advantage.

Furthermore, RCA is valuable in identifying the competitive position and potential of commodities in international trade. Commodities with high RCA values can be prioritized for development initiatives to enhance their global competitiveness. Monitoring the annual dynamics of RCA values provides a reference for evaluation and informs the formulation of strategic measures to improve global competitiveness. Previous studies have used RCA to measure international competitiveness, particularly in the agricultural sector (Tao et al., 2025; Tapia et al., 2025). Mathematically, RCA can be formulated as in Equation 1 (Tapia et al., 2025):

$$RCA = \frac{\left(\frac{X_{ki}}{X_{ti}}\right)}{\left(\frac{X_k}{X_t}\right)} \dots\dots\dots (1)$$

X<sub>ki</sub> represents the export value of country i for commodity k, X<sub>ti</sub> represents the total export value of country i for all commodities, X<sub>k</sub> represents the total export value of all countries for commodity k, and X<sub>t</sub> represents the total export value of all countries for all commodities.

The RCA index ranges from 0 to infinity. A value less than 1 indicates a lack of competitiveness in the exported commodity, while a value greater than 1 indicates competitiveness. A higher RCA value reflects a higher level of competitiveness for the exported commodity in the target market.

The second method is the Export Product Dynamics (EPD) concept, which measures a country’s export performance for a specific market. EPD generates an EPD matrix that combines market attractiveness and business strength information (Faujan & Bachtiar, 2024).

This matrix identifies product position characteristics in four quadrants. Rising Star represents an ideal condition in which demand in the destination market increases while, at the same time, a country's export market share also expands. In this position, the product demonstrates relatively rapid growth in market share, indicating strong competitiveness and reflecting the most favorable or optimal market position (Akbar & Widyastutik, 2022). Falling Star indicates a condition in which a country's total export market share records positive growth (greater than zero), while the export market share of a particular product or commodity declines. This position is considered more favorable than the Lost Opportunity category, as the overall export share continues to grow despite a reduction in the market share of the specific commodity (Destiningsih et al., 2020). Lost Opportunity position refers to a market condition characterized by an unexpected decline in a country's export market share, resulting in the loss of potential export opportunities in international trade. This category is marked by a decrease in market share for a product that is otherwise experiencing dynamic growth in the global market. Such a situation implies that the global supply and demand for the product are expanding faster than the country's ability to supply it, leading to a relative decline in its competitiveness (Ikasari, 2024). Retreat indicates a decline in a country's export market share for a particular product, accompanied by a contraction in total exports, thereby placing the product in a less competitive and stagnant position in the international market (Firdausy et al., 2025). Furthermore, the four EPD quadrants can be seen in Figure 1 (Luhur et al., 2019).

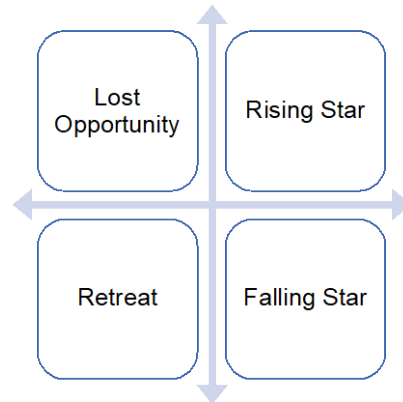


Figure 1. Product Position in EPD

The third method used is OLS approach commonly employed method in gravity models. It analyzes trade creation and the impact of trade diversion within the context of the FTA (Jagdamba & Kannan, 2020). This approach enables a comprehensive evaluation and comparison of the impact of AIFTA on palm oil export performance across ASEAN-3 countries. By employing these methodologies and considering specific factors related to the palm oil trade, this study aims to provide a detailed understanding of the impact of AIFTA on the export performance of palm oil in each ASEAN-3 country.

## Analysis

### Initiatives to Increase Local Palm Oil and Other Oil Seeds Production in India

With a population of 1.4 billion people in 2021 (World Bank, 2020), India ranks as the world's second-largest consumer of palm oil, accounting for 13 percent of global palm oil consumption. To meet its demand, India imports palm oil from various countries, primarily Indonesia and Malaysia, which held market shares of 63 percent and 30 percent, respectively, in 2020 (International Trade Centre, n.d.-a). In fact, India stands as the largest palm oil importer globally, with imports reaching 8.1 million tons in 2021, representing 18 percent of the total global palm oil imports (WWF-India, 2020; International Trade Centre, 2023).

One of the challenges anticipated due to India's large population is the projected doubling of palm oil imports by 2030 (Lakshmi et al., 2022). To address this, the Indian government has implemented several programs aimed to boost domestic palm oil production. The first program, the Oil Palm Development Programme (OPDP), was launched in 1991 under the Technology Mission on Oil Seeds and Pulses (TMOP). It focused on expanding palm oil cultivation in six states: Andhra Pradesh, Karnataka, Tamil Nadu, Orissa, Gujarat, and Goa. In 2004, the OPDP program was incorporated into the Integrated Scheme of Oilseeds, Pulses, Oil Palm & Maize (ISOPOM), expanding the scope of land expansion to 12 states (Ministry of Agriculture of India, 2011), and extending into the 2010s, further supported this goal by providing subsidies and promoting high-yielding seed varieties (Jha & Kumar, 2019). In addition to palm oil production, India has emphasized increasing domestic oilseed cultivation to reduce its reliance on palm oil imports. The National Food Security Mission (NFSM), initiated in 2007, has consistently designed and implemented various strategies to enhance oilseed productivity, including for mustard, soybeans, and sunflowers. Although the NFSM is recognized for its significant role through its strategic focus and policy interventions, recent data indicate a decline in productivity for soybean and sunflower. This finding suggests that the achievement of productivity gains has not been uniformly realized across all target crops and implementation periods, despite intensive efforts (Patel et al., 2024). Nevertheless, rather than diminishing its importance, this outcome underscores the need to frame its role as a "viable alternative" within a broader strategy, one that contributes to a more diversified domestic edible oil portfolio, collectively aimed at reducing India's overall import dependency, rather than functioning as a direct, volumetric substitute for palm oil, which continues to hold substantial yield advantages.

In 2011, the Indian government initiated the Oil Palm Area Expansion (OPAE) program as part of the Rashtriya Krishi Vikas Yojana (RKVY), a financing scheme to support the agricultural sector and achieve 4 percent agricultural growth. The OPAE program aimed to open at least 60,000 hectares of new palm oil plantations between 2011 and 2012, with a focus on areas near processing plants to enhance technical and economic feasibility. The target production was set at 250 to 300 thousand tons within five years since the program's implementation (National Food Security Mission, 2011). Simultaneously, India's soybean production has also expanded considerably, driven by research and development efforts by the Indian Institute of Soybean Research (IISR) and the Indian Council of Agricultural

Research (ICAR) (Patel et al., 2024). The introduction of high-yielding soybean varieties and improved farming techniques has contributed to increased domestic production, reducing the country's dependency on palm oil imports.

Furthermore, the Indian government's drive towards self-sufficiency in palm oil production is evident in the National Edible Oil Mission-Oil Palm (NMEA-OP), launched in 2021. This initiative aims to expand oil palm cultivation to 1 million hectares by 2025-26, aiming to decrease import dependency and stabilize domestic prices (Mahdi, 2023). This strategy aligns with India's broader goal of achieving edible oil self-sufficiency while addressing the need for a sustainable solution to meet the growing demand for edible oils. The timeline of palm oil production in India is shown in Figure 2. Based on these observations, it is evident that the Indian Government's policy focuses on increasing domestic palm oil production by expanding palm oil areas and reducing imports. This diversification strategy, alongside tariff adjustments, illustrates India's comprehensive approach to balancing domestic production with import needs, aiming to secure a stable and sustainable supply of edible oils. These measures have significant implications for India's commitment to FTAs, which have gained momentum globally through bilateral and multilateral cooperation.

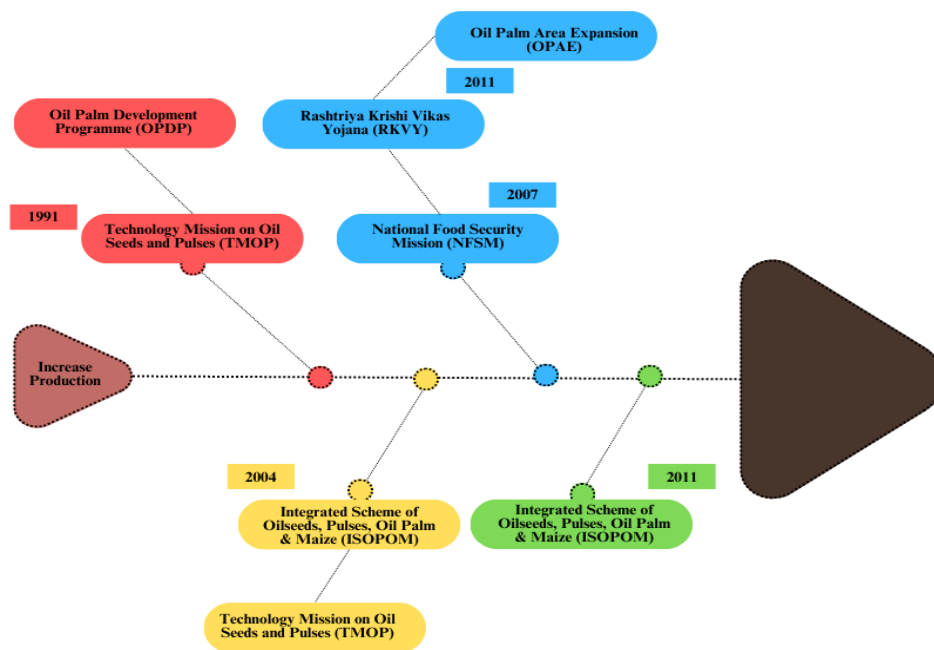


Figure 2. Initiatives to Increase Local Palm Oil Production in India

### Import Values of Palm Oil and Its Derivatives by India

According to data published by the Ministry of Commerce and Industry of India (2023), India has ratified at least 51 international cooperation agreements. Among this extensive array of agreements, AIFTA holds a pivotal role in facilitating the establishment of a vast free trade zone. This ambitious endeavor positions India's free trade zone as one of the largest on a global scale. The primary aim of the AIFTA is to minimize and eventually eliminate trade

taxes, encompassing an impressive 76.4 percent of total goods coverage (FTA Support Center, 2010).

The Annex 1 schedule of tariff commitments under the AIFTA provides insights into the goods eligible for tariff reductions by India for the ASEAN-5 countries, namely Indonesia, Malaysia, Thailand, Singapore, and the Philippines. Palm oil and its derivatives (HS 151110 and 151190) are classified as special products in this context. As a result, the agreed timeframe for tariff reduction does not reach 0 percent. Nevertheless, import tariffs on these products have gradually declined over the years.

Starting from initial tariffs of 76 percent (HS 151110) and 86 percent (HS 151190) in 2010, notable reductions have been achieved. By 2019, import tariffs had been significantly lowered to only 37.5 percent (HS 151110) and 45 percent (HS 151190). This progressive decline in tariffs reflects ongoing adjustments in line with the AIFTA agreements. Moreover, an analysis of the period since 2010 reveals noteworthy fluctuations in palm oil exports to India, particularly those from Indonesia and Malaysia under HS code 151110 (see Figure 3). On the other hand, exports from Indonesia alone exhibit sharp fluctuations under HS code 151190 (see Figure 4). This disparity in fluctuations can be attributed to the fact that Malaysia imposes a lower export duty on its CPO than Indonesia. Since 2011, Indonesia has introduced a revised export duty system intended to promote increased investment and production in the downstream sector of refined palm oil products, which have greater value than crude oil forms (Husin et al., 2023). This export tax policy has reduced the competitiveness of crude palm oil exports while encouraging local producers to prioritize domestic sales to palm oil refineries (Maulana et al., 2023; Rosyadi et al., 2021).

These observations emphasize the dynamic nature of the palm oil trade between ASEAN-3 countries and India, reflecting various factors that influence export patterns and trade dynamics within the industry. The example of different export duty approaches taken by Indonesia and Malaysia highlights the contrasting strategies employed by these countries and the potential impact on their trade relationships.

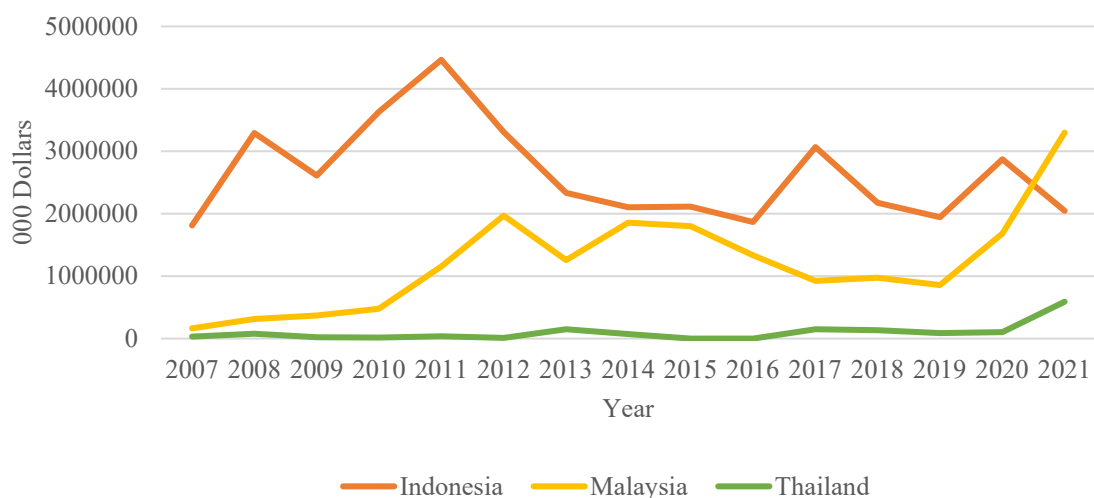


Figure 3. Export Values of HS 151110

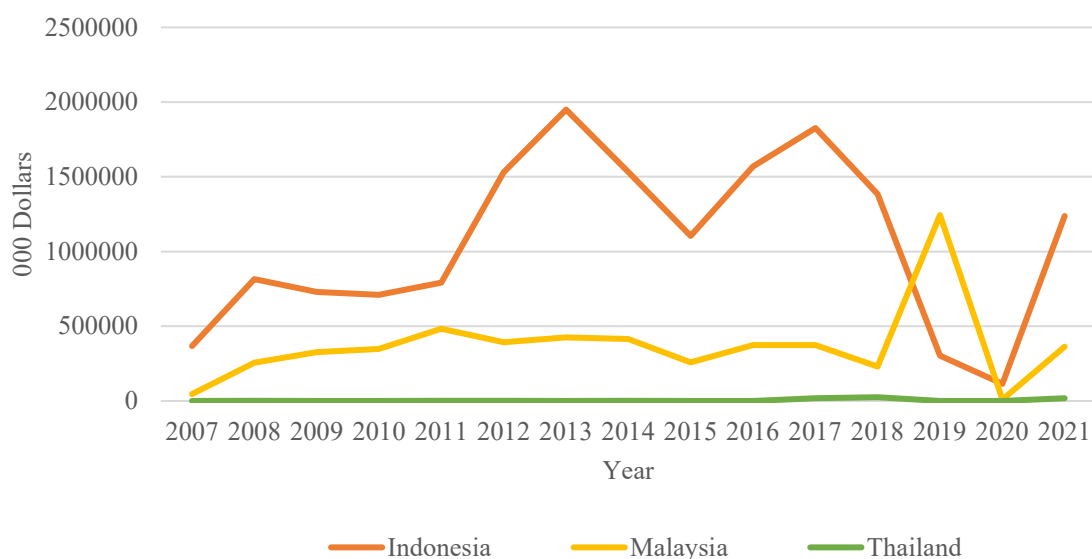


Figure 4. Export Values of HS 151190

### Revealed Comparative Advantage

Figures 5 and 6 present the RCA values of palm oil products (HS 151110 and HS 151190). RCA value represents the comparison between a specific country's palm oil exports and the total exports of other products in the Indian market, as well as the comparison between palm oil imports and the imports of other products in the Indian market. In Figure 5, the RCA value of the Indonesian HS 151110 product has declined since 2012, two years after the implementation of AIFTA. In contrast, Malaysia and Thailand have exhibited an upward trend, with Malaysia surpassing Indonesia's RCA value in 2021. It indicates that the impact of AIFTA varies among the ASEAN-3 countries. Several factors contribute to the competitiveness of palm oil exports to the Indian market, including the implementation of Higher CPO for its derivatives in Indonesia, increased demand for Malaysian palm oil in India, and the development of the palm oil industry in India (Arsyad et al., 2020; Tandra et al., 2022).

Regarding the HS 151190 product (see Figure 6), both Indonesia and Malaysia have experienced a declining trend in export competitiveness, albeit with different steepness. Indonesia has shown a steeper decline than Malaysia, which exhibits a more gradual downward trend. On the other hand, Thailand has shown an increasing trend, with 2021 marking the first year it achieved an RCA value > 1, indicating a relatively low but improving competitiveness in the Indian market. One contributing factor to this success is Thailand's exemption from imposing export duties or levies on palm oil, setting it apart from Indonesia's policies. In addition, the geographical advantage of Thailand becomes evident as a journey from Phuket to any southern port in India takes only 4-5 days, whereas it takes approximately 10-12 days from both Indonesia and Malaysia. Recent studies show that the distance between production sites and markets can significantly increase transportation costs, ultimately reducing product competitiveness compared to alternative options. Endogenous transport

cost models suggest that transport prices are largely influenced by geographic distance and trade volume (Hafner et al., 2023). Furthermore, high transportation costs, often resulting from long distances and extended transit times, can hinder trade volumes, especially when logistics systems are inefficient, and delivery delays are common (Grzelakowski, 2024; Quiroz Villanueva et al., 2025).

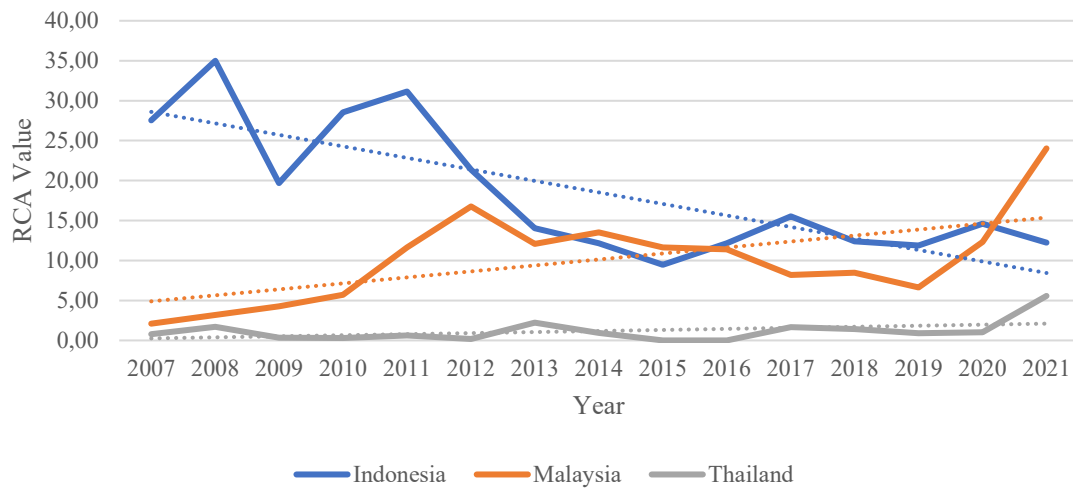


Figure 5. RCA Values of HS 151110

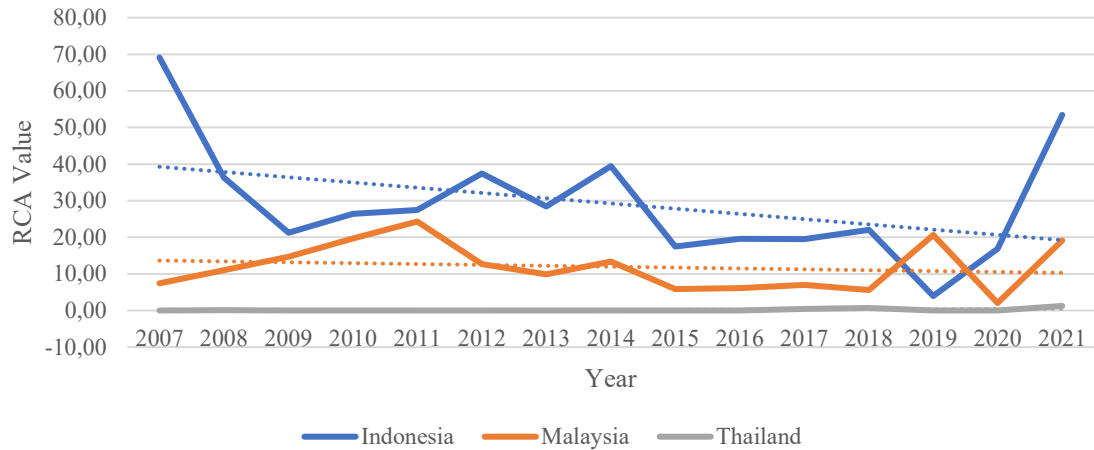


Figure 6. RCA Values of HS 151190

### Export Product Dynamic (EPD)

The EPD analysis results for the HS 151110 product, as depicted in Figure 7, highlight the decline in the competitiveness of Indonesian palm oil in the Indian market, placing Indonesia in the Lost Opportunity quadrant. This decline is notable despite the overall growth of the palm oil trade in India during the same period. This indicates an inability to capture export market share in the destination country, resulting in lost opportunities to export to the

Indian market. Strategies that can be carried out to improve the competitiveness of palm oil in India include product diversification with improved quality and specifications to meet consumer preferences in the market. On the other hand, Malaysia occupies the Falling Star quadrant, indicating some improvement in competitiveness, albeit not in a dynamic manner. In contrast, Thailand is positioned in the Rising Star quadrant, signaling increasing competitiveness in the Indian market, accompanied by fluctuating competitiveness of Malaysian palm oil and a decline in the competitiveness of Indonesian palm oil.

Shifting the focus to the HS 151190 product in the Indian market (see Figure 7), Malaysia and Thailand maintain relatively stable positions in the Falling Star and Rising Star quadrants, respectively, similar to the HS 151110 product. However, there is a significant change in the positioning of Indonesia's HS 151190 product, now falling under the Rising Star quadrant. This shift suggests an improvement in the competitiveness of the HS 151190 product in the Indian market (see Table 2).

Table 2. EPD Values for HS 151110 and HS 151190 products in ASEAN-3

EPD	HS 151110			HS 151190		
	Indonesia	Malaysia	Thailand	Indonesia	Malaysia	Thailand
X	-0.31	2.64	0.50	7.63	0.67	0.12
Y	0.01	-0.11	0.04	0.01	-0.11	0.04

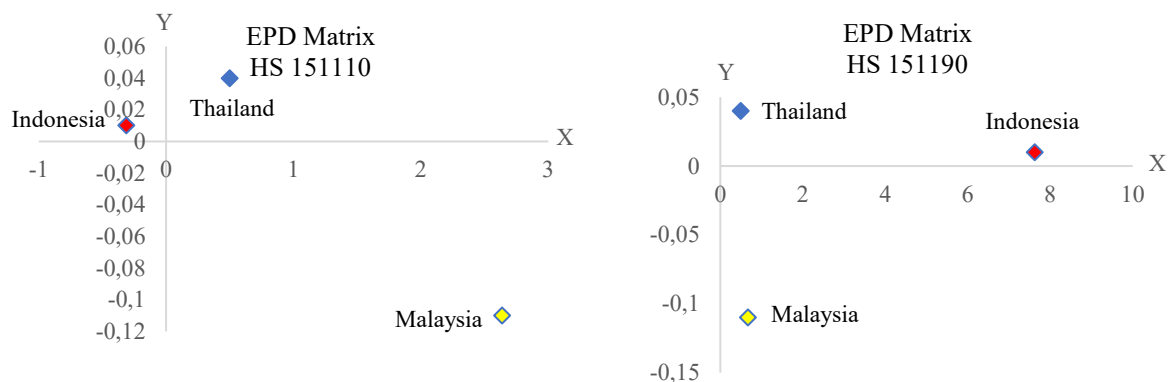


Figure 7. EPD Values of HS 151110 and HS 151190

The results of this study shed light on the dynamic nature of palm oil competitiveness among Indonesia, Malaysia, and Thailand in the Indian market for both HS 151110 and HS 151190 products. They highlight the importance of monitoring and understanding market trends to navigate the evolving landscape and capitalize on emerging opportunities effectively.

## Gravity Model

The gravity model equation used in this study is specified in Equation 2.

$$\text{Log}(EXP_{ij}) = \beta_1 + \beta_2 \log(GDP_i) + \beta_3 \log(GDP_j) + \beta_4 \log(POP_j) + \beta_5 \log(EXR_i) + \beta_6 \log(RDIST_{ij}) + \beta_7 \log(AREA_i) + \beta_8(FTA) + \beta_8(Border) + \varepsilon_{ij} \dots\dots\dots (2)$$

The variables used in the analysis are defined as follows:  $EXP_{ij}$  represents the export value from country  $i$  to country  $j$ ,  $GDP_i$  represents the GDP of country  $i$ ,  $GDP_j$  represents the GDP of country  $j$ ,  $POP_j$  represents the population of country  $j$ ,  $EXR_i$  represents the exchange rate of country  $i$ ,  $RDIST_{ij}$  represents the remote distance between country  $i$  and country  $j$ , and  $AREA_i$  represents the land area dedicated to palm oil cultivation in country  $i$ .  $FTA$  is a dummy variable that indicates whether a country participates in an FTA, where 1 represents participation, and 0 represents non-participation.  $Border$  is a dummy variable that takes a value of 1 if country  $i$  and country  $j$  share a direct border and 0 if otherwise.

This study uses the Poisson Pseudo Maximum Likelihood (PPML). This method of panel data regression is a statistical technique commonly used in the context of the gravity model of international trade. The gravity model explains the flow of trade between countries based on factors such as their economic size, distance, and other relevant characteristics. The PPML approach is specifically designed to address the characteristics of count data, such as the number of trade transactions, which often exhibit a discrete and non-negative nature (Correia et al., 2020; Weidner & Zylkin, 2021).

In the context of the gravity model, the PPML panel data regression aims to estimate the relationships between various variables that influence trade flows. The model assumes that trade flows follow a Poisson distribution, which is suitable for count data. This method is utilized to estimate the parameters and examine the relationships between the variables, as well as their impact on palm oil export value. The results in Table 3 highlight the significant influence of nearly all independent variables on palm oil exports to India. These variables encompass the GDP of the exporting country, the GDP of the importing country, the population of the importing country, the exchange rate of the exporting country, the remote distance between countries  $i$  and  $j$ , and the border between countries  $i$  and  $j$ .

The regression results (see Table 3) indicate that a 1 percent increase in the exporting country's GDP leads to a noteworthy 4.21 percent decrease in palm oil exports to India. Conversely, a 1 percent increase in the importing country's GDP corresponds to a substantial 9.76 percent increase in palm oil exports to India. These findings underscore the considerable impact of these factors on palm oil exports to the Indian market and contribute to our understanding of the factors influencing palm oil exports and trade dynamics among the studied countries. POP had a negative coefficient value, so it is quite logical to see a negative relationship between population and exports. An increase in population decreases per capita GDP and, hence, reduces demand for consumption (Kopecky, 2023; Kozlovskiy et al., 2020). In line with this pattern, regression results indicate that a 1 percent increase in the population

of trade partner countries leads to a 7.79 percent decrease in exports, a relationship that is statistically significant at the 5 percent level.

Table 3. Results of Poisson Pseudo Maximum Likelihood Panel Data Regression

Variable	Coefficient	Std. Error	z-Statistic	Prob.
$GDP_i$	-4.216660	2.103295	-2.004788	0.0450*
$GDP_j$	9.767420	4.627221	2.110861	0.0348*
$POP_j$	-7.799421	3.532217	-2.208081	0.0272*
$EXR_i$	12.69696	3.135165	4.049855	0.0001*
$RDIST_{ij}$	-16.04243	8.000287	-2.005232	0.0449*
$AREA_i$	0.394113	0.206290	1.910480	0.0561
$FTA$	0.199223	0.291994	0.682284	0.4951
<i>Border</i>	-2.962711	0.436553	-6.786604	0.0000*

The relationship between exchange rates (EXR) and palm oil exports is noteworthy. The positive value associated with EXR signifies a meaningful connection between the strength of the exporting country's currency and palm oil export volumes. Specifically, a mere 1 percent uptick in the currency's strength translates to a remarkable 12.69 percent surge in palm oil exports. This outcome underscores the intricate interplay between currency valuation and trade dynamics, offering insights into the market's responsiveness to exchange rate fluctuations (Barbiero, 2021; Lal et al., 2023; Yusiana et al., 2022).

Conversely, the impact of geographical distance on palm oil exports emerges through the RDIST variable. This variable assumes a negative value, suggesting an adverse effect of increasing the distance between exporting and importing nations. A minute 1 percent increment in this distance correlates with a substantial 16.04 percent decline in palm oil exports. This revelation underscores the tangible influence of distance in shaping trade patterns and highlights the complexities of international trade logistics.

The analysis of the variables AREA and FTA reveals notable insights into their influence on palm oil exports. Specifically, the coefficients associated with these variables are 0.39 and 0.19, respectively. It suggests that a mere 1 percent augmentation in palm oil cultivation area would yield a proportional uptick of 0.39 percent in palm oil exports. Moreover, the presence of AIFTA is associated with a projected increase of 0.19 percent in palm oil exports. However, it is imperative to exercise caution when interpreting these findings. Despite the seemingly positive relationships between the variables and palm oil exports, further examination indicates that their impacts may not be statistically significant. This implies that while incremental changes in the palm oil area and the presence of AIFTA may lead to marginal increases in palm oil exports, these changes are not robust enough to be considered

statistically meaningful predictors of the performance of ASEAN-3 palm oil exports to India. In essence, the observed coefficients underscore the potential influence of the variables on palm oil export dynamics. Nevertheless, the lack of statistical significance prompts a more tempered interpretation of their actual impact within the broader context of ASEAN-3 palm oil exports to India (Glorius et al., 2021; Pratiwi, 2021).

Lastly, the variable "Border" considers the geographical proximity of countries and their connection to palm oil exports. The finding indicates that as the geographical distance between nations' borders increases, the value of palm oil exports decreases by 2.96 percent. This result underscores the significance of physical proximity in shaping trade volumes and highlights the intricate web of factors that collectively determine trade outcomes.

### **The Mixed Impact of AIFTA**

The combination of RCA, EPD, and gravity model analyses reveals a complex picture of AIFTA's impact on the palm oil trade, with both positive contributions and significant limitations. On the positive side, AIFTA has contributed to tariff predictability and provided a stable institutional framework for trade between ASEAN-3 countries and India. The gradual tariff reduction from 76-86 percent in 2010 to 37.5-45 percent by 2019 has likely prevented more restrictive trade measures that might have emerged in the absence of the agreement. The FTA has also fostered closer diplomatic ties and technical cooperation in agriculture between ASEAN and India, creating indirect benefits beyond mere tariff considerations. Furthermore, the agreement has enabled Thailand, a smaller producer, to significantly improve its market position, demonstrating that FTAs can benefit countries that combine tariff advantages with strategic domestic policies. However, the negative impacts and limitations of AIFTA are equally significant and more pronounced, as evidenced by several empirical findings.

First, the "special products" classification of palm oil meant that tariff reductions were never intended to reach zero percent, thereby limiting the agreement's transformative potential compared to other sectors with full liberalization. The non-significant FTA coefficient (0.199,  $p > 0.05$ ) in the gravity model confirms that tariff concessions alone have not generated statistically meaningful trade creation.

Second, the FTA's benefits exhibit significant heterogeneity. While Thailand has solidified its position as a "Rising Star" according to RCA and EPD metrics, Indonesia and Malaysia have seen a marked erosion of competitiveness. This divergence indicates that trade liberalization is insufficient to offset domestic regulatory constraints; for instance, Indonesia's export levies on crude palm oil appear to have weakened its competitive position relative to regional peers.

Third, AIFTA has inadvertently highlighted the primacy of non-trade factors over tariff concessions. India's GDP growth emerged as the strongest positive driver of palm oil exports (a 9.76 percent increase per 1 percent GDP growth), while distance (-16.04 percent) and border proximity (-2.96 percent) exerted far greater influence than FTA membership. India's domestic industrial strategies frequently undermine the efficacy of FTA preferences. These

policies, such as OPDP, ISOPOM, OPAE, and NMEA-OP programs, prioritize import substitution and self-sufficiency, thereby creating an inherent structural conflict with the liberalizing objectives of FTAs that tariff reductions alone cannot mitigate.

Fourth, the agreement has not addressed non-tariff barriers, including sanitary and phytosanitary measures, sustainability certification requirements, and technical standards, which increasingly influence palm oil trade. As global attention on sustainable palm oil intensifies, these non-tariff factors may become even more decisive than tariff concessions.

This synthesis reveals that while AIFTA provides a necessary institutional foundation for trade, its impact remains conditional upon complementary domestic policies, geographical factors, and broader market dynamics. Policymakers must therefore recognize both the agreement's enabling role and its inherent limitations in driving export performance. The mixed results across countries and product categories underscore the need for differentiated strategies rather than a one-size-fits-all approach to leveraging FTA benefits.

## Conclusions

This study yields three principal conclusions regarding the impact of the AIFTA on palm oil export performance, based on RCA, EPD, and gravity model analyses. First, based on RCA and EPD analyses, it appears that Indonesia and Malaysia have experienced a decline in comparative competitiveness for palm oil exports to India relative to Thailand. Although Indonesia and Malaysia have a strong history in the palm oil industry and are the world's two largest producers, the analysis shows that Thailand has maintained a more competitive position in the Indian market. Factors such as changes in Indonesia's export tax policies, Thailand's geographical proximity to Indian ports, and differences in domestic trade regulations have contributed to this divergence in competitiveness among ASEAN-3 countries.

Even so, the decline in competitiveness is not insurmountable. Indonesia and Malaysia can take strategic steps to reposition themselves in the palm oil export market to India. These steps could include improving product quality, diversifying into innovation-based value-added products, increasing sustainability and ethical practices in palm oil production through certification schemes, and strengthening trade diplomacy to ensure fair trading conditions. By taking a comprehensive approach that addresses multiple aspects, Indonesia and Malaysia have the potential to reverse the downward trend in competitiveness and return to playing an important role in the palm oil export market to India.

Second, the gravity model analysis reveals that even though there is an FTA between ASEAN-3 countries and India, there is no statistically significant influence on palm oil export trade between these parties. The non-significant FTA coefficient indicates that the agreement has not led to meaningful trade creation in palm oil exports, despite over a decade of implementation. On the positive side, the absence of trade diversion effects suggests that AIFTA has not distorted global palm oil trade patterns or disadvantaged non-member producers. However, the lack of significant trade creation suggests that tariff reductions alone

are insufficient to overcome structural trade barriers. Instead, the analysis suggests that India's macroeconomic trajectory and geographical positioning are more significant drivers of palm oil trade than preferential trade agreements. The positive impact of India's GDP growth and the logistical advantages of proximity consistently supersede the benefits of FTA membership. Moreover, the efficacy of such agreements is fundamentally constrained by India's domestic industrial policies, which prioritize reduced import dependence. This strategic objective exists in inherent contradiction with the liberalization sought through tariff concessions.

Third, India's pursuit of self-sufficiency in edible oils, particularly palm oil, is poised to play a critical role in shaping the future of its agricultural sector and international trade dynamics. This policy direction negatively impacts ASEAN-3 export prospects by potentially constraining long-term market growth as domestic production increases and import reliance decreases. However, this challenge also creates positive opportunities for technology transfer, investment in India's palm oil sector, and joint ventures in downstream processing that ASEAN-3 countries could leverage as alternative engagement strategies. Rather than viewing Indian self-sufficiency solely as a threat, ASEAN-3 countries can participate in India's domestic industry growth, transforming a potential trade loss into an investment opportunity.

Based on this assessment of AIFTA's impacts, several policy recommendations emerge. For Indonesia and Malaysia, it is essential to address declining competitiveness by reforming domestic export tax policies that disadvantage crude palm oil exports. These countries should pursue product diversification into value-added derivatives and invest heavily in sustainability certification schemes such as ISPO, MSPO, and Roundtable on Sustainable Palm Oil (RSPO) to differentiate their products in an increasingly environmentally conscious Indian market. Strengthening trade diplomacy efforts to ensure fair trading conditions and negotiating for reduced non-tariff barriers in future FTA reviews will also be crucial.

For Thailand, the priority should be to consolidate its gains by maintaining zero export duties and capitalizing on its geographical proximity to Indian ports. Thailand can use its improved market position to negotiate for further concessions in future FTA reviews while continuing to enhance product quality and sustainability standards to sustain its "Rising Star" trajectory.

For all ASEAN-3 countries, developing coordinated negotiating positions for the AIFTA review is recommended, with particular attention to addressing non-tariff barriers, including mutual recognition of sustainability standards, streamlined sanitary and phytosanitary procedures, and improved trade facilitation measures. Establishing an ASEAN-India Palm Oil Dialogue platform would enable these countries to address trade concerns collectively and present unified positions on critical issues affecting the palm oil sector.

For long-term strategy, all ASEAN-3 countries should build resilience through market diversification, reducing dependence on any single destination market while maintaining competitiveness in India through cost efficiency, quality improvement, and strategic positioning as reliable suppliers of sustainable palm oil. Leveraging the Comprehensive Economic Cooperation Agreement framework to expand cooperation beyond trade into

investment, technology transfer, and technical assistance for India's palm oil sector development would transform the challenge of Indian self-sufficiency into opportunities for ASEAN-3 companies to participate in India's domestic industry growth through joint ventures, technology licensing, and management contracts.

Overall, AIFTA's impact on the palm oil trade remains limited. The agreement provides an important institutional framework, but cannot substitute for complementary domestic policies and strategic industry positioning. The outcome of India's self-sufficiency efforts will have far-reaching implications for both India's food security and the regional economic relationship with key Southeast Asian exporters.

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