International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

Analysis of Factors Affecting the Value of Indonesian Crude Palm Oil (CPO) Exports to the United States When the RFS Policy is in Effect

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Abstract

The Renewable Fuel Standard (RFS) policy in the United States presents both opportunities and challenges for Indonesia's Crude Palm Oil (CPO) exports. This study aims to analyze the factors influencing the value of Indonesia's CPO exports to the United States during the period 2005–2023, focusing on Malaysia's export volume, Indonesia's CPO production, and international CPO prices. A quantitative method with time series data was employed and analyzed through multiple linear regression using EViews 13. The results show that Malaysia's CPO export volume has a negative and significant effect on Indonesia's export value, indicating direct market competition. In contrast, Indonesia's CPO production has a positive and significant effect, underscoring the importance of domestic capacity in supporting export performance. International CPO prices also have a positive and significant effect, meaning that rising global prices can increase export value. Overall, the findings confirm that beyond demand and supply dynamics, competition with Malaysia and compliance with the RFS standard are crucial determinants of export performance. This study recommends strengthening sustainability certification (ISPO), enhancing trade diplomacy, and stabilizing production to improve competitiveness in the U.S. market.

Keywords: CPO Exports, Renewable Fuel Standard (RFS), International Price, Production, Competition, United States.

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INTRODUCTION

Indonesia holds the position as the world's largest producer of crude palm oil (CPO), with a total production of around 45 million metric tons in 2023 (Kementan, 2022). As a leading supplier in the global market, Indonesia recognizes the vast potential of CPO in the international arena and continues to expand its export opportunities (Widyaningtyas & Widodo, 2017). Export activities play a strategic role in supporting the country's foreign exchange earnings, most of which are derived from the utilization of natural resources in the form of both raw materials and semi-finished goods (Calvin, 2023). Thus, exports serve as one of the main drivers of the national economy through their contribution to state revenue and foreign exchange reserves (Natasha & Aminda, 2021).

Broadly speaking, Indonesia's exports are divided into oil and gas commodities and non-oil and gas commodities. Non-oil and gas exports include agricultural products such as palm oil and rubber, mining products such as coal, as well as manufactured goods. All of these commodities form the foundation of Indonesia's foreign trade performance (Putri et al., 2024). Within the agricultural sector, the plantation subsector makes a significant contribution to national economic growth, accounting for 3.88% of GDP and contributing more than 93% of agricultural export value in 2024. Palm oil occupies a strategic position in this subsector due to its diverse functions, both in the food industry (such as cooking oil, margarine, and cocoa butter substitutes) and in the non-food industry (such as biodiesel, oleochemicals, pharmaceuticals, and other industrial raw materials) (Nurmalita & Wibowo, 2019). Accordingly, palm oil exports play an essential role in generating foreign exchange for the country (Aprina, 2014).

In global trade, Indonesia consistently dominates the CPO market with export volumes exceeding 26 million tons in 2023, far surpassing competing countries such as Malaysia, the Netherlands, Guatemala, and Thailand. Natural factors such as the tropical climate and the extensive plantation areas in Sumatra, Kalimantan, Sulawesi, and Papua are the main supports for Indonesia's competitive advantage in production and exports (Itamary & Hendrati, 2022). The main importers of Indonesian CPO include India, China, the United States, and the European Union.

The development of Indonesia's CPO exports shows a fluctuating trend influenced by various factors, including global prices, exchange rates, and external shocks such as the COVID-19 pandemic in 2019–2020, which weakened demand (Azahari et al., 2020). In addition, environmental issues such as deforestation have shaped consumer preferences and influenced international trade policies (Amiruddin et al., 2021). Meanwhile, Malaysia, as Indonesia's main competitor, continues to maintain a significant

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market share in the United States through the implementation of the MSPO sustainability certification scheme, which has been widely recognized by a number of developed countries.

The United States market presents both challenges and opportunities for Indonesian CPO exports, particularly since the implementation of the Renewable Fuel Standard (RFS). This policy was first introduced in 2005 and expanded in 2007, mandating the blending of renewable fuels—including biodiesel—into transportation fuels as an effort to reduce greenhouse gas emissions (EPA, 2025). Compliance with this policy requires meeting sustainability standards, particularly related to life-cycle greenhouse gas emission reductions of 20% to 60% depending on the fuel category. These stringent requirements directly affect the competitiveness of Indonesian CPO exports compared to Malaysia.

Although the United States is not the largest market for Indonesian CPO exports, this market is distinctive as it is driven by renewable energy policies rather than solely by food industry demand. The RFS policy, for instance, has driven U.S. biodiesel consumption to more than 20 billion gallons in 2023, creating opportunities for CPO as a substitute for soybean oil. Nevertheless, non-tariff barriers and sustainability issues remain the main obstacles that must be addressed through national certification systems such as ISPO (ICCT, 2022; GAPKI, 2023).

This study specifically focuses on the United States market due to its strategic role as a rapidly growing biodiesel market with a strict regulatory regime. While India and China absorb larger volumes of Indonesian CPO imports, the United States stands out because it combines regulation-driven demand with strong environmental oversight, making it a relevant case to examine. Accordingly, the purpose of this research is to analyze the influence of three main factors—the export volume of Malaysia, Indonesia's CPO production levels, and international CPO prices—on the performance of Indonesia's CPO exports to the United States within the framework of the RFS policy.

METHODOLOGY

This study employs a quantitative approach using secondary time-series data covering the period 2005–2024, which coincides with the implementation of the Renewable Fuel Standard (RFS) policy in the United States. The research focuses on the commodity Crude Palm Oil (CPO) under Harmonized System (HS) Code 1511 to ensure analytical consistency. The dependent variable in this study is the export value of Indonesian CPO to the United States, while the independent variables include the export

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volume of Malaysian CPO to the United States, Indonesia's CPO production, and international CPO prices. Data are obtained from official international sources such as UN Comtrade, Trademap, MPOB, World Bank, EPA, and USDA, as well as national sources including Statistics Indonesia (BPS) and the Ministry of Agriculture. The documentation method is used to collect the time-series data, which are then tested for validity and consistency.

This study applies multiple linear regression analysis to examine the influence of independent variables on the export value of Indonesian CPO to the United States. The model is chosen to identify the key determinants of export performance while capturing the interaction between global competition, domestic production capacity, and price dynamics within the framework of the RFS policy. Data processing is carried out with the assistance of statistical software such as EViews 13 and Stata to ensure reliable results. This approach provides empirical evidence on the factors affecting Indonesia's CPO exports and serves as the basis for policy recommendations and strategic considerations.

DISCUSSION

The Influence of Malaysia's CPO Export Volume on Indonesia's CPO Export Value

The regression analysis shows that Malaysia's CPO export volume has a negative and significant effect on Indonesia's CPO export value to the United States during the implementation of the Renewable Fuel Standard (RFS) policy. This finding indicates that an increase in Malaysia's export volume to the U.S. market tends to reduce Indonesia's export value, reflecting direct competition in capturing the same market share. Within Porter's Competitive Advantage framework, Malaysia's strength lies in production cost efficiency and broader international recognition of its Malaysian Sustainable Palm Oil (MSPO) certification. This provides Malaysia with additional competitiveness in accessing the U.S. market. For illustration, in 2012 Malaysia was able to export 680,084 tons of CPO to the United States, while Indonesia only reached 40,552 tons. This condition shows that Malaysia's dominance has the potential to suppress Indonesia's position if adaptive strategies are not immediately implemented.

The RFS policy further reinforces this dynamic because the U.S. market only accepts energy feedstocks that meet greenhouse gas emission reduction standards and sustainability requirements. Malaysia adapted relatively quickly through the implementation of MSPO certification, while Indonesia only began promoting the Indonesian Sustainable Palm Oil (ISPO) certification in the following period. Therefore, to strengthen competitiveness, Indonesia needs to: (1) improve the quality and international

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acceptance of ISPO certification; (2) enhance trade diplomacy, particularly through bilateral forums with the United States; and (3) increase production cost efficiency and supply chain transparency.

This finding is consistent with the study by Anzani et al. (2023), which emphasizes Malaysia's dominance in influencing Indonesia's CPO export competitiveness. Furthermore, Mora et al. (2021) also confirm that Indonesia's export market share is highly sensitive to Malaysia's performance. Similarly, Khairunisa and Novianti (2017) highlight that sustainability-based regulations are a critical factor in global CPO trade.

The Influence of Indonesia's CPO Production on Indonesia's CPO Export Value

The regression analysis shows that Indonesia's CPO production has a positive and significant effect on its export value to the United States. This finding indicates that an increase in domestic production capacity directly contributes to higher export volumes, while a decline in production weakens export performance. Thus, production availability is a determining factor in maintaining the sustainability of Indonesia's CPO exports. Empirically, national CPO production increased from 14.6 million tons in 2005 to 47 million tons in 2023, a development consistent with the export growth trend. However, production growth slowdowns caused by structural factors, such as aging plantations and limited replanting programs, have been shown to constrain export performance.

In the context of the Renewable Fuel Standard (RFS), although this policy was not used as an independent variable in this research, its implications remain relevant. RFS emphasizes that increasing production alone is insufficient to ensure export sustainability without compliance with market-required sustainability standards. The U.S. market demands the fulfillment of emission reduction targets and the adoption of certified supply chains, such as the Indonesian Sustainable Palm Oil (ISPO) or the Roundtable on Sustainable Palm Oil (RSPO). Therefore, strategies to increase production capacity must be accompanied by strengthening sustainability certifications to maintain Indonesia's CPO export competitiveness.

This finding is consistent with previous studies by Maksum et al. (2021), Suherman et al. (2024), and Asliyana and Setyowati (2022), which affirm that national production plays a significant role in determining Indonesia's CPO export value in the international market.

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The Influence of International CPO Prices on Indonesia's CPO Export Value

The regression results show that international CPO prices have a positive and significant effect on Indonesia's CPO export value to the United States. In other words, higher global prices encourage an increase in export value, while lower global prices reduce export value. This is in line with export value theory, demand-supply theory, and comparative advantage theory, which affirm that global prices act as the main incentive for producers. For example, when international CPO prices fell from US$752/MT in 2012 to US$601/MT in 2014, Indonesia's export value also declined from US$609,003 thousand to US$525,865 thousand, showing a direct relationship between global price fluctuations and export performance.

Within the framework of the RFS policy, global price dynamics further complicate Indonesia's export position. Price declines not only reduce export earnings but also coincide with strict sustainability requirements. Therefore, global price stability becomes a critical factor in maintaining Indonesia's CPO export performance. This finding is supported by Pradina & Adhitya (2023), who found a significant influence of international prices on Indonesia's exports in both the short and long term, as well as Asliyana & Setyowati (2022), who highlight international prices as the dominant external factor shaping Indonesia's CPO export performance.

CONCLUSION

Based on the results of multiple linear regression analysis and the relevant theoretical framework, several key conclusions can be drawn. First, Malaysia's CPO export volume has a significant negative effect on Indonesia's CPO exports to the United States. This indicates that an increase in Malaysia's exports tends to suppress Indonesia's exports, reflecting direct competition in the same market. This finding highlights the importance of strengthening Indonesia's competitiveness strategy, particularly through the enhancement of ISPO sustainability certification and trade diplomacy, to reduce pressure from Malaysia's market dominance.

Second, Indonesia's CPO production and international CPO prices are proven to have a significant positive effect on export value to the United States. An increase in domestic production drives export growth, while a decline in production directly reduces export value, reaffirming the fundamental role of domestic capacity. Similarly, a rise in global CPO prices increases export value, while a decline weakens it, in line with Export Value Theory, Supply-Demand Theory, and Comparative Advantage Theory. However, global price fluctuations create volatility risks that make Indonesia's exports vulnerable to

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international market dynamics, thereby emphasizing the need for production stability and compliance with RFS sustainability standards.

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