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ANALYSIS OF THE COMPETITIVENESS OF INDONESIAN CRUDE PALM OIL (CPO) EXPORTS IN THE GLOBAL MARKET

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ABSTRACT

Palm oil stands as a vital commodity within Indonesia's plantation industry, holding strategic importance and contributing significantly to the country's foreign exchange earnings primarily through its derivative, Crude Palm Oil (CPO), which is obtained from oil palm fruit. Indonesia currently leads as the world's top exporter of CPO. Despite this prominent position, the country has yet to develop the capacity to influence or determine global CPO pricing. In fact, 2024 saw a drop in both the volume and value of CPO exports, highlighting persistent challenges in maintaining competitiveness on the international stage. This research seeks to evaluate the extent to which GDP, trade costs, and exchange rates impact Indonesia's CPO trade value in global markets. The study relies on secondary data sourced from various official and credible institutions, including publications from government bodies and relevant international organizations. A panel data regression model is employed, using the Gravity model approach, as it is well-suited for examining cross- country and time-series data. Findings from the analysis reveal that Indonesia's per capita GDP, the per capita GDP of importing countries, and exchange rates have a significant effect on the export value of CPO. Conversely, the trade cost variable does not demonstrate a statistically significant impact.

Keywords: Crude Palm Oil (CPO), Grafity Model, Gross Domestic Product (GDP)

INTRODUCTION

As a major global palm oil producer, Indonesia boasts vast plantation areas and Holds a crucial position in the international palm oil supply chain. According to a 2020 report by Statistics Indonesia (BPS), The area occupied by oil palm plantations totaled approximately 14.6 million hectares, resulting in a production of 45.7 million tons. The following year, although the area increased to 16.8 million hectares, production actually declined slightly to 45.1 million tons. However, the trend began to improve in 2022, with production increasing to approximately 46.8 million tons, despite the remaining area. This increase continued in 2023, when production reached 47.1 million tons. In 2024, production is expected to increase again to 47.5 million tons, with the area remaining at 16.8 million hectares.

The development of Indonesian CPO export volume and value from 2020 to 2024 showed an unstable trend. In 2020–2021, although volume remained at 25.93 million tons, export value jumped from US$17.36 million to US$26.77 million, due to rising global market prices. In 2022, volume decreased slightly to 24.99 million tons, but export value rose to US$27.74 million, indicating that CPO prices remained high. Changes began to emerge in 2023. Although export volume

rose to 26.12 million tons, the export value declined to US$22.69 million, signaling a drop in global CPO prices. This downward trend persisted into 2024, when export volume fell to 21.60 million tons and the value decreased further to US$20.01 million. Several factors have contributed to the recent decline in Indonesia's crude palm oil export value, including tighter international trade regulations, decreasing CPO prices on the world market, and production difficulties stemming from climate change and limited availability of raw materials.

Increasing export capacity is closely related to changes in exchange rates. A strengthening rupiah can cause domestic product prices to rise in the global market, resulting in a decrease in export volume. Conversely, a depreciating rupiah makes domestic products more competitive in the global market, potentially driving increased export volume. These changes in export capacity significantly contribute to improving the national trade balance (Huda, 2017). Furthermore, from a theoretical perspective, competitiveness is crucial for explaining the success regarding the performance of Indonesian exports on the world stage. According to Porter (1990), a product's competitiveness depends on its ability to enter and survive in a competitive global market. Every country must be able to offer better products than its competitors to win the market. A country's unique strengths and capabilities in a particular field are indicators of its product's competitiveness.

This research focuses on the fluctuating state of CPO exports, which is a concern due to its potential direct impact on the national economy. Being a primary commodity and one of the largest contributors to the country's foreign exchange earnings, changes in CPO export value not only impact state revenues but also impact the stability of the agricultural sector, the processing industry, and the standard of living of farmers. This situation serves as the background for analyzing the competitiveness of Indonesian Crude Palm Oil exports in the global market, to support policymaking that can maintain consistent and sustainable export performance.

RESEARCH METHODS

The research adopts a quantitative methodology based on secondary data serving as the primary source. The data used includes the market value of CPO (crude palm oil) exports from Indonesia to destination countries, obtained from the official UN Comtrade website. Furthermore, data on Indonesia's Gross Domestic Product (GDP) and that of its trading partners was obtained from the World Bank website. Information on trade costs was also collected from UN Comtrade and several other relevant sources. Meanwhile, data on exchange rates was obtained from the official World Bank website.

This study utilizes panel data regression as the chosen analytical approach, utilizing the Gravity Model as the underlying approach. The dataset combines time series and cross- sectional data covering the period 2015 to 2024 with the aim of 6 countries, namely India, China, Pakistan, the Netherlands, Bangladesh and Spain. Before being analyzed, all data is converted first into natural logarithm (ln) form so that the estimation results are more stable and interpretative. Data processing is carried out using EViews 12 Software. The gravity model is mathematically formulated through the following equation:

$$Xij=\alpha \times GDPi \times GDPj:Dij$$

Information:
Xij : Export value of country i to country j
GDPi : Gross domestic product of the country i
GDPj : Gross domestic product of the country j
Dij : The distance between countries i and j

This research uses the following model approach:

$$LnEXP = \beta 0 + \beta 1\ LnGDPi + \beta 2\ LnGDPj + \beta 3\ LnBPR + \beta 4\ LnNTR + \mu$$

Information:
LnEXP = The value of Indonesian CPO exports to importing countries (US$/ Tahun)
LnGDPi = Indonesia's GDP per capita (US$/Tahun)
LnGDPj = GDP per capita of importing countries (US$/Tahun)
LnBPR = Indonesia's Trade Costs to Importing Countries (US$/Tahun)
LnNTR = Indonesia's Exchange Rate (US$/Tahun)
B = Regression Coefficient

RESULTS AND DISCUSSION

Model Fit Test Chow Test

In the Chow test, the decision to accept or reject a hypothesis is determined by the Chi- Square probability value. If the probability exceeds 0.05, the null hypothesis (H0) is accepted and the alternative hypothesis (Ha) is rejected. Conversely, if the probability value falls below 0.05, then H0 is rejected in favor of Ha.

Table 1. Chow Test

Effects Test	Prob.
Cross-Section F	0.0000
Cross-Section Chi-Square	0.0000

Source: Data processed 2025

Based on the findings presented in Table 1, both the Cross-Section F and Cross-Section Chi-Square tests yield probability values that fall within the significant range Chi-Square tests are 0.00. Since this value being less than the 0.05 significance level, the results warrant rejecting H0 in favor of Ha. This implies that the Fixed Effect Model is the most appropriate choice for the analysis. This illustrates the existence of a fixed characteristic gap between cross-section units in the data that cannot be ignored, and FEM can accommodate this difference more accurately than the Common Effect model.

These results align with previous research that also selected The selection of the fixed effects model is supported by the results of the Chow test. Research by Prasetyo and Jannah (2020) found that the FEM model was more appropriate due to inter-firm heterogeneity that significantly impacts the estimation results.

Once the Fixed Effect Model (FEM) has been chosen, the next step in the analysis involves conducting the Hausman test, which is used to determine the most appropriate estimation method between the Fixed Effects and Random Effects models.

Hausman Test

In the Hausman test, if the probability value is greater than 0.05, the Random Effects model is deemed more suitable. On the other hand, if the value falls below the 5 percent threshold, the Fixed Effects model is considered the more appropriate option.

Table 1. Hausman Test

Test Summary	Prob.
Cross-Section Random	0.0469

Source: Data processed 2025

As presented in Table 2, A probability value of 0.04, which is less than the 0.05 significance level, confirms that the Fixed Effects model is the most suitable option. Consequently, this study adopts the Fixed Effects model as the basis for further analysis. The outcomes of both estimation tests confirm that the Fixed Effects model is the most suitable. In line with the findings of Setyo and Anggita (2015), when both the Chow and Hausman tests support the use of the Fixed Effects model, the Lagrange Multiplier test becomes unnecessary, and the estimation can proceed using the Ordinary Least Squares (OLS) method.

Classical Assumption Test Multicollinearity Test

Table 2. Multicollinearity Test

Variable	VIF
Indonesia's GDP per capita	1.383796
Importer GDP per capita	1.133008
Trade costs	2.957583
Exchange rate	2.778394

Source: Data processed 2025

Table 3 shows that all independent variables have The VIF values are less than 10, which implies that the regression model under analysis is not affected by multicollinearity. This is consistent with Gujarati and Porter's (2009) statement that a VIF value below 10 indicates The regression model is free from serious multicollinearity issues.

Heteroscedasticity Test

Table 4. Heteroscedasticity Test

Test	Prob.
F-Statistic	0.0662
Obs*R-Squared	0.0862

Source: Data processed 2025

Table 4 indicates that the probability value of Obs*R-Squared exceeds 0.05. This suggests that the regression model does not show indications of heteroscedasticity. This finding aligns with the view of Gujarati and Porter (2009), who explain that when the p-value from the Breusch-Pagan test or a similar test is greater than 0.05, there is not enough evidence to reject the null hypothesis, meaning heteroscedasticity is likely absent.

Model Weighting

This study employs the Fixed Effects Model (FEM) as the most suitable panel data regression approach. The estimated results using this weighting model are presented in the following regression output.

Table 5. Results of the Fixed Effect Model estimation

Independent Variable	Dependent Variable Export Value Cross Section Sur coefficient	t- Statistic	prob
Constant	-5.933739	-1.158506	0.2522
Indonesia's GDP per capita	-3.416630	-2.673494	0.0101
Importer's GDP per capita	3.360582	2.779273	0.0077
Trade costs	0.650392	1.806352	0.0769
Exchange rate	0.374052	2.180598	0.0339
F Statistic		14.28853	0.000000
R-Squared			0.720040
Adj R-Squared			0.669647

Source: Data processed 2025

Referring to the estimation results using the fixed effects model, The panel data regression equation is formulated as follows:

Y = -5.933739 -3.416630GDPi + 3.360582GDPj + 0.650392BPR + 0.374052NTR.

Referring to the estimation results in Table 5, the regression model indicates that a 1% increase in Indonesia's GDP (GDPi) is associated with a 3.42% decline in the country's crude palm oil (CPO) export value. On the other hand, a 1% rise in the GDP of the importing country (GDPj) contributes to a 3.36% increase in Indonesia's CPO export value. Additionally, a 1% increase in trade costs is estimated to raise the export value of CPO by 0.65%. Lastly, a 1% depreciation in the exchange rate against the US dollar is found to have a positive effect, boosting Indonesia's CPO export value by 0.37%.

The regression output shows a constant value of -5.933739, suggesting that, on average, the combined effect of all independent variables results in a negative impact of -5.933739 on Indonesia's CPO export value to the global market. This result is consistent with the findings of Ridwannulloh and Sunaryati (2018), who, through the Gravity Model approach, observed that variables such as geographical distance and the real exchange rate significantly and negatively influenced the performance of Indonesia's palm oil exports to key trading partners.

Model Suitability Test
Coefficient of Determination (R^2)

The coefficient of determination (R^2) serves to evaluate the proportion of variance in the dependent variable that is accounted for by the independent variables within the model. A higher R^2 indicates a stronger explanatory power of the model in capturing the behavior of the data. According to the results of the regression analysis, the R^2 value is 0.72. This means that 72% of the changes in the dependent variable Indonesia's CPO export value are explained by the model's independent variables, which include Indonesia's per capita GDP, the per capita

GDP of importing countries, trade costs, and the exchange rate. The remaining 28% is influenced by other factors not included in the model.

F Test (Simultaneous)

The estimation results show a probability A probability value of 0.000, being lower than the 0.05 threshold, leads to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_a). This implies that taken together, Indonesia's per capita GDP, the per capita GDP of importing countries, trade costs, and the exchange rate have a statistically significant effect on the value of CPO exports.

Discussion

Indonesia's Gross Domestic Product per capita

Table 5 presents the regression analysis results, showing a coefficient of -3.416, indicating a negative relationship. This suggests that a 1% increase in the variable is estimated to lead to a 3.416% decrease in the value of Indonesia's CPO exports. The calculated t-value is - 2.673494, which is less which is lower than the critical t-value of 2.00404, and accompanied by a probability value of 0.01 also falling below the 0.05 level of significance This indicates that the null hypothesis (H0) is rejected in favor of the alternative hypothesis (Ha) Therefore, the Indonesian GDP per capita variable has a statistically significant impact with a negative relationship direction on the value of Indonesian CPO exports. This finding is also supported by Hasanah & Djaenudin's 2024 study entitled "Analysis of Renewable Energy Directive Policy, ILUC, and Indonesian CPO Competitiveness to the European Union Market", which shows that GDP per capita shows a statistically significant relationship with a negative relationship direction on Indonesian CPO exports to the European Union.

Gross Domestic Product per capita Importers

Referring to the regression analysis in Table 5, the coefficient value of 3.360 indicates a positive correlation between the variable and Indonesia's crude palm oil (CPO) export value. This means that a 1% rise in the variable is estimated to increase Indonesia's CPO exports by around 3.360%. The calculated t-statistic is 2.779273, which surpasses the t- critical value of 2.00404, with the associated p-value of 0.00 falling significantly below the 0.05 level, underscoring its statistical significance. These findings confirm that the per capita GDP of the importing country significantly and positively influences Indonesia's CPO export performance. This conclusion aligns with the research conducted by Ridwannulloh and Sunaryati (2018) in their study "The Determinants of Indonesian Crude Palm Oil Export: Gravity Model Approach", which found that the GDP per capita of importing nations is a key factor influencing the value of Indonesia's CPO exports. Their analysis also reported a p-value of 0.00, indicating significance as it is under the 0.05 level reinforcing the importance of this variable in shaping Indonesia's CPO trade with its trading partners.

Trade costs

Based on the regression analysis in Table 5, the coefficient for the trade cost variable stands at 0.650, which reflects a positive association. In other words, a 1% rise in trade costs is estimated to raise Indonesia's CPO export value by 0.650%. Nevertheless, the calculated t- statistic of 1.806352 falls short of the critical t-value of 2.00404, and the corresponding p- value of 0.07 is above the 0.05

threshold. This suggests that while the relationship is positive, it is not statistically significant.

These results are in line with the study by Supriana et al. (2020), titled "Indonesian Cinnamon Exports in the International Market: Competitiveness and Performance". Their findings revealed that trade costs do not negatively affect Indonesia's cinnamon export performance. The estimation in their research showed a probability value of 0.49, which exceeds the 5% significance level, there by reinforcing the conclusion that although trade costs may have a positive impact, the effect is not statistically significant in influencing export value.

Exchange rate

The regression analysis results in Table 5 show that the exchange rate variable carries a coefficient of 0.374, suggesting a positive relationship. This implies that a 1% depreciation in the exchange rate is projected to boost Indonesia's CPO export value by 0.374%. With since the calculated t-statistic of 2.180598 surpasses the critical t-value of 2.00404, and the p-value of 0.03 lies below the 0.05 significance threshold, it can be concluded that findings confirm that the exchange rate has a statistically significant and positive impact on the dependent variable.These findings are in agreement with the study conducted by Hutami (2021), which also found a significant positive relationship between the exchange rate and Indonesian CPO exports to India over the period 1990–2019.

CONCLUSION

1. Indonesian CPO exports have shown a fairly strong upward trend in recent years, particularly until the early 2020s, although fluctuations persisted due to global demand dynamics. However, since 2023, there has been a decline in both export volume and value, reflecting new challenges in trade and production.
2. Indonesia's CPO export value is 72% explained by four key variables: Indonesia's GDP percapita, the GDP percapita of importing countries, trade costs, and the exchange rate. Among these, the GDP percapita of the importing countries shows a statistically significant and positive influence. In contrast, Indonesia's own GDP per capita has a significant negative relationship with export performance. While trade costs have a positive association, their effect is not statistically meaningful. On the other hand, the exchange rate is shown to exert a significant and favorable influence on the value of Indonesia's CPO exports.

SUGGESTION

1. Future research is recommended to include additional factors that fall outside the scope of this study's model, such as trade costs (export tariffs and export duration) in analyzing Indonesian CPO exports.
2. For the government, because the GDP percapita level in countries receiving exports have been shown to positively influence CPO export performance, Indonesia should focus on establishing trade partnerships with high-income countries. This can be achieved through trade agreements, promoting sustainable products, and improving quality and environmental standards.

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