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# Analysis of Competitiveness and Determinants of Indonesia Palm Oil Export

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**ABSTRACT:** Indonesia is the largest palm oil producing country in the world along with Malaysia, but in 2024 Indonesia's total oil exports will decline. The reason for choosing palm oil exports is because Indonesia's largest export commodity is palm oil, the method used is the revealed comparative advantage index to measure comparative advantage and the gravity model to measure factors that influence exports, the results show that Indonesia has a comparative advantage for trading partner countries, then Indonesia's GDP has a positive but insignificant effect on palm oil exports, the GDP of trading partner countries has a negative but insignificant effect, the exchange rate has a negative but insignificant effect on palm oil export, population significantly effect on palm oil exports and economic distance has a negative but insignificant effect on palm oil export.

**Keywords**: Export, Palm Oil, Revealed Comparative Advantage (RCA)

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## INTRODUCTION

International trade is an activity that supports the economy of every country in the world. This activity is carried out to minimize the expenditure of countries that are low on natural resources, and countries with abundant natural resources will have their own advantages, by trading natural resource products to countries with low natural resources. David Ricardo (Ricardo, 2015) explains that countries that do not have an absolute advantage can participate in profitable international trade if the country is able to specialize in the production of goods that have a comparative advantage in terms of cost or lower price compared to other countries. Because countries that are able to produce goods at relatively lower costs and relatively cheaper prices have a comparative advantage compared to other countries. International trade activities make it easier for each country to complement each other in meeting the consumption of goods and services of each country.

Indonesia is one of the countries that conducts international trade and focuses on agriculture, one of which is palm oil. Palm oil is known for its advantages, such as high oil production, lower costs, and stability at high temperatures and requires a smaller land area compared to other vegetable oil cultivation (Amin et al., 2024). Due to the fact that Indonesia is the world's largest producer and supplier, palm oil plays a significant role in the economy growth (Brin, 2024).

| Negara tujuan | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|
| India | 5.886,5 | 5.459,1 | 7.376,8 | 6.415,8 | 4.655,3 | 4.631,9 | 3.101,8 | 4.999,3 | 5.406,9 |
| Tiongkok | 4.230,1 | 3.209,3 | 3.642,2 | 4.216,4 | 5.983,1 | 4.483,5 | 4.860,0 | 4.278,7 | 5.440,9 |
| Pakistan | 2.326,4 | 2.108,5 | 2.194,1 | 2.459,6 | 2.217,0 | 2.490,9 | 2.679,6 | 2.811,2 | 2.513,6 |
| Belanda | 1.441,4 | 1.157,4 | 1.428,6 | 1.262,3 | 1.103,7 | 765,5 | 580,1 | 551,5 | 392,8 |
| Amerika Serikat | 736,5 | 959,8 | 1.159,3 | 1.120,9 | 1.195,4 | 1.130,3 | 1.650,8 | 1.809,8 | 1.984,6 |
| Spanyol | 1.011,2 | 1.127,0 | 1.377,5 | 1.170,9 | 1.086,1 | 1.143,6 | 994,8 | 636,7 | 655,1 |
| Mesir | 1.158,1 | 1.002,3 | 1.202,9 | 938,1 | 1.096,4 | 975,3 | 1.041,9 | 682,4 | 967,8 |
| Bangladesh | 1.143,1 | 934,1 | 1.239,6 | 1.409,7 | 1.359,7 | 1.034,9 | 1.327,4 | 1.330,1 | 1.368,8 |
| Italia | 1.204,3 | 1.012,3 | 1.128,5 | 899,8 | 753,4 | 944,7 | 622,9 | 595,8 | 401,4 |
| Singapura | 797,2 | 730,0 | 623,6 | 435,8 | 594,6 | 367,4 | 56,3 | 109,6 | 22,4 |
| Lainnya | 8.497,5 | 6.921,0 | 7.884,7 | 9.464,4 | 10.335,5 | 9.875,7 | 10.655,1 | 9.372,1 | 9.474,1 |
| **Jumlah** | **28.432,4** | **24.620,7** | **29.257,6** | **29.793,8** | **30.380,4** | **27.843,7** | **27.570,8** | **27.177,2** | **28.628,4** |

Figure 1. Palm Oil Exports by Main Destination Countries, 2015 – 2023
*Source: Central Bureau of Statistics*

Figure 1 explains that the growth of palm oil exports has increased every year. However, it decreased in 2016 and 2020, due to uncertain global conditions. The decline in exports in 2016 was due to the global economic slowdown and falling commodity prices, while in 2020 there was the Covid-19 outbreak which caused countries to experience a decline in agricultural commodity exports. India, China, and Pakistan are the top importers of palm oil. The Netherlands, Pakistan, Italy, and Singapore cut back on their imports of Indonesian palm oil in 2023, suggesting that rivalry in the palm oil market may be the cause of the importing nations' decreased demand. In 2024, BPS noted that palm oil exports experienced a significant decline with a decline of 39.22 percent from the 2023 achievement (CNN, 2024).

According to empirical research, there is only used one way to examine import and export values, such as trade specialization index, export product dynamic (EPD), and constant market share, in international commerce. However, in this study, the researcher uses two approaches, namely the gravity model approach to analyze the influence of variables and Revealed Comparative Advantage (RCA) to analyze competitive export values (Pratiwi, 2021) (Diana, 2024) (Hotma, 2024).

The gravity model is based on the theory of gravity proposed by Isaac Newton in 1687. This economic model, which was developed by Jan Tinbergen in 1962, is used to predict bilateral trade relations based on the economic size and distance between two units/countries, which is always used in international trade (Bergstrand et al., 2024). In this study, the economic measures used in the gravity theory are Gross Domestic Product (GDP), Population of the destination country and Exchange rate.

Based on the explanation above, researchers are interested in analyzing and focusing research on palm oil exports by analyzing comparative advantages and factors that influence palm oil exports using the gravity model.

## THEORETICAL REVIEW

### *International Trade*

The main driver of national development, particularly in emerging nations, is international commerce. This condition results from the kind and direction of commerce between many nations and affects a nation's economic structure (Carolina & Aminata, 2019). The main goal of international trade is to gain profit and minimize the country's expenditure in producing commodities that are scarce in the region. Menurut (Krugman & Obstfeld, 2010)

According to (Mankiw, 2021) international trade is trade between two countries that can gain benefits by opening specialization based on comparative advantage, with different specializations in each country, they gain benefits in each transaction. Comparative advantage is the ability of a country, company or individual to produce goods or services at a lower cost than its competitors, comparative advantage can provide benefits in trade (Ricardo, 2015). revealed comparative advantage is an economic analysis technique to quantify a nation's comparative advantage in exporting a specific commodity. Using the ratio of a nation's market share of a specific product to the global market share of the same product, this method compares export performance across nations.

### *Export*

Export is the activity of selling goods and services from one country to another, with the aim of expanding the market, increasing foreign exchange and creating jobs. The commodities exported are quite diverse, in the form of raw materials, finished goods, agricultural products and others. This activity can develop one industry so that it can encourage other industries that can encourage various other economic sectors.

***Gross Domestic Product (GDP)***

Gross domestic product (GDP) income obtained by a country from the sale of goods and services that occur in a country, GDP can also describe the level of public welfare in a certain period. Rapid GDP growth indicates economic growth. If a country's economic growth improves, then people's purchasing power also increases. (Putra et al., 2022). State income consists of consumption, investment, government (spending), exports and imports.

$$Y = C+I+ G+(X-M)\text{…….. (1)}$$

According to research (Yafi & Adyanti, 2024) and (Akhmadi & Lee, 2025) states that Gross Domestic Product has a positive and significant effect on palm oil exports. This shows that partner countries have high purchasing power will also create high demand and Indonesia's GDP increases, it will increase the capacity of palm oil production so that the volume available for export can also increase.

H1: Indonesia's GDP has a significantly positive effect on palm oil exports

***Exchange rate***

The exchange rate is the price of a currency against another currency. In the context of international trade, the exchange rate is very important because it is a measuring tool in export-import transactions between countries. According to (Mankiw, 2016), the exchange rate is the amount of domestic currency needed to obtain one unit of foreign currency. Meanwhile, according to (Salvatore, 2019) the exchange rate affects the competitiveness of a country in the global market, because it affects the price of goods and services between countries.

Based on research (Diana, 2024) and (Akhmadi & Lee, 2025) revealed that the exchange rate has a negative and significant effect on palm oil exports. This is because if the exchange rate of the exporting country depreciates, the export value and export volume of that country will increase.

H2: The exchange rate significantly negative effect on palm oil exports

***Population***

Population is the number of people living in an area that continues to change every year due to the increase and decrease in the number of humans, this population change affects the amount of trade in terms of demand and supply. The demand for a commodity will change along with the population, while in terms of supply it affects changes in the number of workers.

According to research (Suroso, 2022) states that the population of partner countries has a positive and significant effect on palm oil agricultural exports. This is because a high population will increase the demand for goods to be consumed.

H3: Population significantly positive effect on palm oil exports

***Distance***

Distance is a proxy for transportation costs, delivery time and access barriers faced by a country when conducting trade. The further the distance

between countries that transact, the greater the costs incurred, causing trade to decline. Economic distance is calculated using the formula below:

$$\text{Ekonomic Distance} = (JGij \times GDPiy)/(\Sigma \text{ Total } GDPiy) \quad (2)$$

Based on research (Pratiwi, 2021), (Akhmadi & Lee, 2025) and (Suroso, 2022) stated that distance has a negative and significant effect on palm oil agricultural exports, this is because the distance between exporting and importing countries is large, exports will be expensive due to increasing transportation and logistics costs.

H4: Distance significantly negative effect on palm oil exports.

**METHODOLOGY**

This study uses secondary data from 2015-2023 on palm oil exports covering 10 partner countries including India, China, the Netherlands, Pakistan, Spain, the United States, Bangladesh, Italy, Egypt and Singapore. The information utilized originates from a number of institutional sources, including CEPII, the World Bank, and the United Nations Commodity and Trade (UNCOMTRADE). then this study uses two analysis methods, namely Revealed Comparative Advantage (RCA) and Gravity model using Poisson Pseudo Maximum Likelihood (PPML).

One popular technique for assessing trade competitiveness is revealed comparative advantage, or RCA. The following is the RCA formula:

$$RCA=(Xij/Xj)/(Xwi/Xw) \quad (3)$$

Notes :
Xij = Export value of commodity I in country j
Xj = Total export value in country j
Xwi = World export value of commodity i
Xw = Total world export value

The RCA index score determines the comparative advantage of a country's commodities, the following is an explanation of the parameter value levels in RCA: (1) A country does not have a comparative advantage in a commodity if its RCA index value is more than 0 but less than 1 ($0 < RCA \leq 1$). (2) A nation has a poor comparative advantage if the RCA index value of a commodity is more than 1 but less than 2 ($1 < RCA \leq 2$). (3) A nation has a substantial comparative advantage if the RCA index value of a commodity is more than 2 but less than 4 ($2 < RCA \leq 4$). (4) A nation has a significant comparative advantage if the RCA index value of a commodity is higher than 4 ($RCA > 4$). (Hinloopen & Van Marrewijk, 2001).

Table 1. Variables, indicators, explanations and sources

| Variable | Indicator | Explanation | Sources |
|---|---|---|---|
| Gross Domestic Product | GDP*i* | GDP (gross domestic product) in US dollars (constant 2015 US dollars) for Indonesia and its partner nations | The World Bank |
| | GDP*j* | | The World Bank |
| Exchange Rate | ER | Local Currency Unit (LCU) to US$ real exchange rate for Indonesian partner nations (2010 = 100) | The World Bank |
| Population | POP | Total population of partner nations per year | The World Bank |
| Distance | DIS | Geographical distance in kilometers between partner country j's and exporting country I's capital cities | CEPII |
| Export | EXP | Indonesia's total yearly exports of agricultural goods, including palm oil (HS. 1511), to partner nations from 2015 to 2023, expressed in current US dollars | UNComtrade |

Furthermore, the analysis of factors that influence Indonesian palm oil exports to major trading partner countries uses a gravity model with Poisson Pseudo Maximum Likelihood (PPML) analysis, which consists of variables that explain the gravity model. The dependent variable is palm oil exports (EXP) and there are 5 independent variables, namely: Gross Domestic Product for Indonesia (GDPi), Gross Domestic Product for partner countries (GDPj), Exchange rate (ER), Population (POP) and Distance (DIS). The analysis model is as follows:

$$\mathrm{LnEXP}_{ijt} = \beta_0 + \beta_1 \mathrm{LnGDP}_{it} + \beta_2 LnGDP_{j_t} + \beta_3 LnER_{jt} + \beta_4 LnPOP_{jt} + \beta_4 LnDIS_{ij} + \varepsilon_t$$

Notes :
$LN\_EXP_{ijt}$ = Natural logarithm of palm oil exports from Indonesia (i, exporter) to partner country j (importer) in year (t)
$LN\_GDP_{it}$ = Natural logarithm of the gross domestic product of Indonesia (i, exporter) in year (t)
$LN\_GDP_{jt}$ = Natural logarithm of the gross domestic product of partner countries (j, importer) in year (t)
$LN\_ER_{jt}$ = Natural logarithm of the exchange rate of the partner country (j, importer) in year (t)
$LN\_POP_{jt}$ = Natural logarithm of the population of the partner country (j, importer) in year (t)
$LN\_GDP_{jt}$ = Natural logarithm of the distance between Indonesia and the partner country (j)
$\beta_0$ = intercept,
εt = error.

## RESULTS AND DISCUSSION

### *Revealed Comparative Advantage (RCA)*

Indonesia has a very significant comparative advantage for trade partner nations, according to the data, which is based on the Revealed Comparative Advantage (RCA) calculations for 10 trading partner countries from 2015 to 2023. According to table 1, only two trade partner nations have a score below 1, while eight trading partner countries have a value more than 1, indicating that Indonesia has a competitive advantage. Over the past three years, the RCA index value in the US, Spain, Italy, and Egypt has been larger than 4 (RCA> 4), demonstrating how robust Indonesia's palm oil exports are in these nations.

The RCA index value in India and Bangladesh explains that Indonesia's palm oil exports are in the category of small and moderate comparative advantages, because they experience fluctuations in value between 1-4 (1 > RCA ≤ 4). While the RCA value in China and the Netherlands has decreased, initially in the strong category to the moderate category.

Table 1 Revealed Comparative Advantage (RCA) Index Values

| Country | RCA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| India | 0,67 | 1,90 | 1,93 | 1,86 | 2,87 | 1,39 | 1,24 | 1,15 | 1,08 |
| Tiongkok | 3,25 | 5,11 | 5,19 | 5,29 | 11,33 | 4,36 | 3,81 | 2,78 | 3,50 |
| Pakistan | 0,44 | 0,74 | 0,75 | 0,58 | 1,39 | 0,67 | 0,74 | 0,64 | 0,50 |
| Belanda | 1,81 | 5,03 | 5,23 | 5,99 | 14,10 | 4,16 | 3,62 | 4,51 | 3,91 |
| Amerika Serikat | 0,94 | 33,02 | 7,71 | 9,62 | 26,18 | 32,28 | 9,87 | 10,25 | 11,16 |
| Spanyol | 3,81 | 0,90 | 22,97 | 17,46 | 47,02 | 0,96 | 23,33 | 21,95 | 20,78 |
| Mesir | 1,81 | 15,70 | 12,09 | 17,17 | 36,45 | 19,14 | 13,72 | 12,80 | 13,82 |
| Bangladesh | 0,68 | 1,46 | 1,95 | 1,30 | 3,25 | 1,45 | 1,43 | 1,12 | 1,01 |
| Italia | 6,33 | 16,40 | 16,24 | 14,27 | 27,28 | 12,35 | 9,61 | 10,97 | 12,02 |
| Singapura | 0,41 | 0,59 | 0,37 | 0,37 | 0,88 | 0,96 | 0,25 | 0,33 | 0,12 |

*Source: Revealed Comparative Advantage (RCA) index*

Note:
RCA value (RCA < 1) No advantage over competitors ( )
RCA value (1 < RCA ≤ 2) is represented Small comparative advantage ( )
RCA value (2 < RCA ≤ 4) indicates a moderate competitive advantage. ( )
RCA value (RCA > 4) indicates a significant edge over competitors. ( )

Table 2 Estimation Results

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.510.279 | 1.119.036 | 2.243.252 | 0.0249 |
| LN_GDP*i* | 0.007427 | 0.028678 | 0.258997 | 0.7956 |
| LN_GDP*j* | -0.006435 | 0.002985 | -2.156.115 | 0.0311 |
| LN_ER | -0.000848 | 0.003689 | -0.229940 | 0.8181 |

| | | | | |
|---|---|---|---|---|
| LN_POP | 0.026647 | 0.003780 | 7.049.359 | 0.0000 |
| LN_DIS | -0.002900 | 0.006790 | -0.427113 | 0.6693 |
| R-Squared | 0.702947 | | | |
| Adjusted R-Square | 0.685266 | | | |
| Prob(LR statistic) | 0.727052 | | | |

*Source: Eviews*

Based on the estimation results in table 2, it shows that the independent variables do not significantly affect palm oil exports to ten trading partner countries. This is explained by the prob value (LR statistic) of 0.727 which is greater than 0.05. Then, the Adjusted R-square value shows a figure of 0.685, which means that the independent variables in this study explain 68.5% of palm oil exports and 31.5% come from other variables. The constant results in this finding are 2,510,279, which explains that if the independent variables are not included in this study, then palm oil exports will have a value of 2,510,279.

This study reveals that Gross domestic product has a positive but insignificant impact, this is not in accordance with the theory that states Gross domestic product will significantly affect exports because the high value of commodity exports will increase domestic Gross domestic product. Although GDP reflects national economic growth, palm oil exports are more influenced by external factors, so that increasing GDP does not have a significant effect on palm oil exports. This study is not in line with the studies (Akhmadi & Lee, 2025) and (Yafi & Adyanti, 2024) which state a positive and significant effect, so the hypothesis is rejected.

This study explains that the GDP of trading partner countries has a significant negative effect, this is not in accordance with the theory, the theory explains that if the GDP of trading partners increases, it reflects an increase in the purchasing power and consumption of a country which increases imports of a commodity. The results of this study can be explained that when the GDP of partner countries increases, the volume of palm oil exports decreases, due to various factors such as: reducing dependence on palm oil imports, diversifying energy or food consumption by replacing palm oil consumption with vegetable oil. This finding is not in line with research (Akhmadi & Lee, 2025) and (Yafi & Adyanti, 2024) explaining a significant positive effect, so the hypothesis is rejected.

This study explains that the exchange rate on palm oil exports has a negative but insignificant effect on palm oil exports. This is not in accordance with the theory, exchange rate depreciation should encourage increased exports, because the price of goods in foreign currency becomes cheaper and more competitive in the international market. However, the results of this finding actually show no significance. This can be caused by several factors: (1) even though the exchange rate depreciates, exporters do not immediately feel the benefits because of long-term factors that use fixed prices, (2) high exchange rate fluctuations can cause uncertainty in international trade which reduces interest in exports. And finally, because of external factors. This finding is not in line with research (Diana, 2024) and (Akhmadi & Lee, 2025), so the hypothesis is rejected.

Meanwhile, the results of this study indicate that the population has a coefficient value of 0.026647, which means that if the population value increases by one unit, the value of palm oil exports will increase by the coefficient value. Additionally, Indonesia's palm oil exports are significantly boosted by the populations of its trade partners. This is consistent with the assumption that a growing population in the destination nation will raise demand for commodities made from palm oil. the results of this study are in line with research (Suroso, 2022) and the hypothesis is accepted.

Lastly, this analysis demonstrates that palm oil exports are negatively but insignificant impacted by economic distance.This means that the distance theory, the further the distance between Indonesia and its trading partner countries, the value of commodity exports will decrease, indicating a weak relationship. This is because the large volume of exports to partner countries means that distance is not the main factor in influencing palm oil exports. The results of this study are not in line with the studies of (Suroso, 2022), (Akhmadi & Lee, 2025) and (Pratiwi, 2021), so the hypothesis is rejected.

## CONCLUSIONS AND RECOMMENDATIONS

Based on this study involving the RCA method and gravity model using PPML, it is concluded that Indonesia, a palm oil producing country, is a country with a comparative advantage to trading partner countries. This is explained by the value of the RCA index exceeding 1. From the estimation results using PPML, it is explained that Indonesia's GDP has a positive but insignificant effect because it is influenced by various external factors, the GDP of trading partner countries has a negative but insignificant effect due to factors such as reducing dependence on palm oil imports, diversifying energy or food consumption by replacing palm oil consumption with vegetable oil. Then the exchange rate has a negative but insignificant effect, the population has a positive but significant effect and economic distance has a negative but insignificant effect.

## FURTHER STUDY

This study has many limitations in the research, it is expected that further researchers will add external factor variables in the research such as language, policy, international commodity prices, global demand and others.

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