Determinants of Production, International Trade Price Index (IHPI) and the Rupiah Exchange Rate on Indonesian Palm Oil Exports in 2007-2021

Lailatul Maulida Azzahra [1], Tsaniyatul Dzuriyah [2], Yeni Ayu Rahati [3], Riyan Andni [4], Ibnu Muttaqin [5], Anne Johanna [6], Buschhaus Avinash [7], Bevoor [8]

[1] *Institut Agama Islam Negeri Kudus, Indonesia*
[2] *Institut Agama Islam Negeri Kudus, Indonesia*
[3] *Institut Agama Islam Negeri Kudus, Indonesia*
[4] *Institut Agama Islam Negeri Kudus, Indonesia*
[5] *Institut Agama Islam Negeri Kudus, Indonesia*
[6] *University of New South Wales Business School, Australia*
[7] *University of Florida, United States*
[8] *Universite McGill, Canada*

Corresponding Author: Riyan Andni, E-mail: riyanandni@iainkudus.ac.id

Article Information:	ABSTRACT
	This research is motivated by the export of palm oil from Indonesia to Malaysia where there are inconsistencies in the determinants that affect the value of exports which can be seen from the number of production levels, the international trade price index (IHPI) and the rupiah exchange rate. speed. This shows the need for research. more about palm oil exports. In this study aims to determine, analyze, explain the influence of Indonesian palm oil exports to Malaysia. The type of research used is quantitative research supplemented by data for the period 2007 to 2021 sourced from the Central Bureau of Statistics (BPS). The data analysis technique used in this study is the Multiple Regression test which includes the Classical Assumption Test, and the Hypothesis Test. The results of the two tests show that in terms of production volume, the International Trade Price Index (IHPI) tends to be positive and not significant, while the rupiah exchange rate tends to be negative and not significant. This means that Indonesian palm oil exports to Malaysia have increased and decreased unbalanced, so these export activities require a strategy that can emphasize export figures by providing information to domestic and foreign investors, both private and government agencies, to pay more attention to several governments. **Keywords**: *Exports, Total Production, International Trade*

INTRODUCTION

Each country certainly has a wealth of natural resources that can be used as an advantage in each country to create a commodity transition from one country to another (Caccialanza dkk., 2020). One of them is in the State of Indonesia as the world's largest producer of palm oil which is the main raw material in meeting the demand for human needs (Maggio dkk., 2019). Where palm oil provides various benefits for the Indonesian economy.

The ratio of use of palm oil continues to increase in line with the capacity of Indonesia's population growth, and developments in production technology and the use of commodities (Scheen dkk., 2020). Most of the palm oil will be exported to increase the country's foreign exchange, control the international trade price index, the amount of production and the rupiah exchange rate (Hamidah dkk., 2020). Meanwhile, export has become an economic activity on the world market that achieves maximum target results by requiring a relationship between oil palm farmers, entrepreneurs and industrial companies (Awad dkk., 2020). Exports of palm oil in Indonesia are stable, always increasing from 2012 to 2021.

Total production of palm oil is the harvest from the plantation business without going through further processing. The potential for further growth in Indonesia's palm oil production is driven by the country's large area which allows for the expansion of plantations, especially oil palm (Su dkk., 2019). Indonesia's climate is ideal for oil palm plantations and supports plant growth and development. In fact, Indonesia's oil palm plantations have continued to grow year after year, which has had an immediate impact (Conte dkk., 2020). On production. the amount of Indonesian palm oil production has also increased from year to year, even seen from the trend of increasing production every year (Kokudo dkk., 2019). With the increase in palm oil production, Indonesia has increased the volume of palm oil exports to a number of countries.

The amount or value of palm oil exports in the global market can be used to determine the international trade price index (Moosavi dkk., 2020). If the price of palm oil is very high, the government must monitor the quality of the product being sold and record whether it is still young or ready to be harvested (Barrows & Ollivier, 2021). A country is more likely to become an exporting country if international trade prices are higher than domestic prices, and palm oil producers clearly prefer to sell to other countries (Bappy dkk., 2021). The quality of palm oil will have an impact on the international trade price index.

Sale and purchase of goods and services from the State of Indonesia to the destination country which results in transactions by suppliers from abroad (Schapper dkk., 2020). Transactions selling goods or services abroad have an effect on the foreign exchange value of the Indonesian currency (Schapper dkk., 2020). When the State of Indonesia receives payments from abroad, this can change the value of foreign currency and become the value of the rupiah currency so that it can be used as initial capital for purchasing raw materials or covering other operational costs to produce returned goods.

According to the Hecksher-Ohlin theory that exports of palm oil can be implemented with export competitiveness in the global market, various destination countries will be affected if a country has high-quality production quantities because an increase in quantity will allow countries to specialize in certain goods (Herr dkk., 2019). When compared to the situation in Indonesia which specializes in other commodities, international prices will have a direct or indirect impact on the quantity and cost of exporting palm oil, in fact, exports are more competitive, very tight if the country frequently exports and when exporters receive payments from the destination country, the value of money will be lowered. exchange it into rupiah so that it can be invested in purchasing raw materials so that it can increase foreign exchange reserves and state income, especially needed in developing countries to advance the economy so that exports continue to be increased again (Laillou dkk., 2013).

In the last fifteen years, Indonesia has succeeded in exporting palm oil to several destination countries such as Japan, South Korea, China, Thailand, Singapore, Malaysia, India, Australia and the United States. Data on destination countries for exporting palm oil can be seen in the following graph:

Graph 1
Data on Average Destination Countries for Palm Oil Exports in 2007-2021
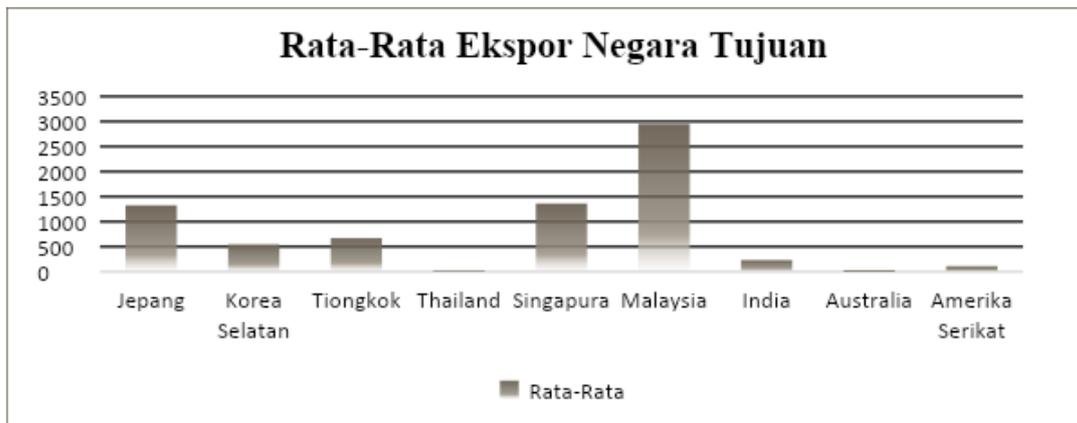
Source: Central Bureau of Statistics

Researchers took 1 out of 9 destination countries for palm oil export activities. It can be seen that the average results show the most increased data and the opportunity for Indonesia's palm oil export market share to only focus on Malaysia compared to these 9 countries. Therefore, researchers will examine more specifically on 1 destination country.

Graph 2
Export Data to Destination Countries for 2007-2021
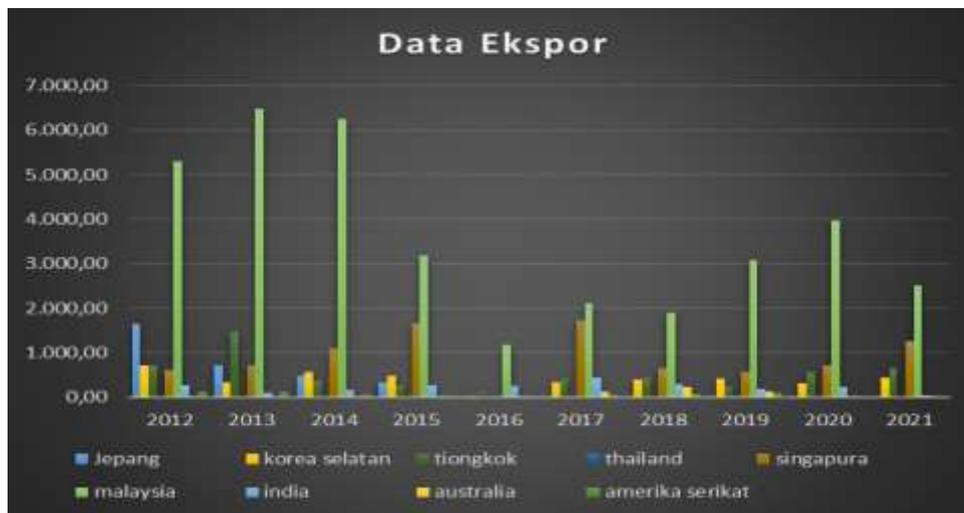
Source: Central Bureau of Statistics

Data processed from sources from the Central Statistics Agency describe 1 destination country to which palm oil exports will be carried out. The research started from 2007 to 2021 in Malaysia (Fernando dkk., 2019). Where the Malaysian state is experiencing a state of very fluctuating export prices, the Malaysian state has become the public spotlight for palm oil export activities to fall in 2016 to 2021 amounting to1,173.74% to 2,512.40% which is caused by unstable palm oil production with minimal conditions of FFB (Fresh Fruit Marks) and many changes in the structure of oil palm.

Graph 3
Total Production, International Trade Price Index, and Rupiah Exchange Rate of Palm Oil in 2007-2021
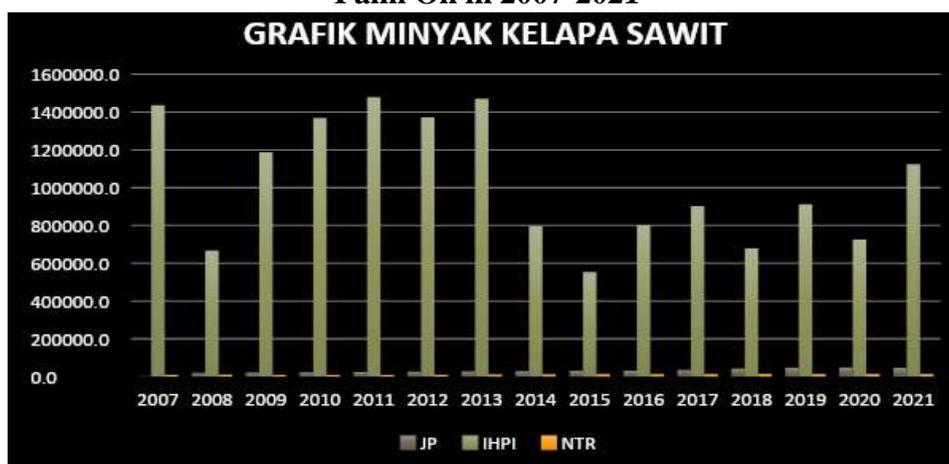
Source: Central Bureau of Statistics

Based on data quoted from the Central Bureau of Statistics from 2007 to 2021 regarding the amount of production, the international trade price index and the export exchange rate of palm oil, it is stated that the production of palm oil in 2007 was able to reach 2041.2%. In the last 15 years, from 2007 to 2021, palm oil production tends to increase (Essandoh dkk., 2020). In 2008 Indonesia's palm oil production only reached 19400.8% and then increased to 21390.5% in 2009, there was a surge in palm oil production changing to 31070% in 2015 (Kumar dkk., 2021). This increase can be seen from 2016 to 2021. Furthermore production has the highest percentage to be more precise in 2020, namely 48296.9% and in the last year 2021 the percentage of total palm oil production has decreased to 46223.3% (Khan dkk., 2020). This happened because the amount of palm oil production was classified as very high, but at that time the State of Indonesia was known for increasing the area of oil palm plantations in the stage where the large number of palm fruit ready to be harvested for export met the needs of industrial and food raw materials in certain destination countries.

In Figure 1 it can be seen that the movement of the international trade price index experiences fluctuating numbers whose values are always changing and cannot be predicted if the value of international trade prices is declared to increase or decrease. In 2007 it was valued at 1437300.5% then in 2008 there was a decrease of 667885.0% making IHPI unstable in increasing export prices further from 2009 to 2021 just like the previous year the numbers fluctuated. This can cause problems and particular concerns in palm oil export activities, namely in 2012 to 2013 and from 2016 to 2017 there is also a conflict of falling world oil prices and will have an impact on the country's foreign exchange finance, especially Indonesia, the largest palm oil producer (Bahoo dkk., 2020). Export demand in several destination countries declined and was triggered by limited fertilization (Angus, 2020), lack of agricultural land, crop failure due to extreme weather (Meyer dkk., 2019). From 2019 to 2020 exports in Indonesia have decreased due to the confirmation that the destination country has been affected by the Covid-19 pandemic outbreak so that palm oil export activities are limited

The rupiah exchange rate was recorded at the Central Bureau of Statistics experiencing a percentage of instability starting from 2007 to 2021. The rupiah exchange rate had the lowest percentage in 2011 of 9068.0% but in 2012 underwent a slight transformation to increase against the rupiah exchange rate of 9670.0 %. This transformation returned in 2015 to 2016 which saw a decline and in 2018 the rupiah exchange rate was higher than 11 years earlier. Even though in 2019 the rupiah exchange rate decreased, in 2020 and 2021 the State of Indonesia managed to achieve an increase in the rupiah exchange rate of 14105.0% to 14269.0%. This means that the rupiah exchange rate has partially increased between 2007-2021, meaning that the rupiah exchange rate has depreciated which will have an impact on the surplus in the international trade balance, starting with the price of goods or palm oil being cheaper compared to the price of foreign goods and the Indonesian state benefiting Therefore, exports of palm oil led to an increase. While the condition of the rupiah exchange rate

that experienced a decline resulted in an overall global crisis or it was said that the price of domestic goods was more expensive than the price of foreign goods, resulting in losses. Palm oil exports led to an increase. While the condition of the rupiah exchange rate that experienced a decline resulted in an overall global crisis or it was said that the price of domestic goods was more expensive than the price of foreign goods, resulting in losses. Palm oil exports led to an increase. While the condition of the rupiah exchange rate that experienced a decline resulted in an overall global crisis or it was said that the price of domestic goods was more expensive than the price of foreign goods, resulting in losses.

According to research conducted by (Wulansari, 2016) have previously examined the amount of palm oil production, the results of the analysis show that there is a significant influence on the level of competitiveness of Indonesian palm oil exports because if production increases, the level of export competitiveness decreases. Besides that (Nurmalita & Wibowo, 2019) researched on the increase in the price of Indonesian palm oil exports to India that the production of palm oil against the rupiah exchange rate compared to the US dollar was 0 which had a very positive and insignificant effect on these exports (Wahyuni dkk., 2021). Also stated that the demand for palm oil exports was positively and significantly influenced by the rupiah exchange rate. With an increase in the rupiah exchange rate, the country's export volume will also increase. Research has been found in case studies on the amount of production, the international trade price index, and the rupiah exchange rate on palm oil exports in Indonesia.

Most of the previous studies have examined the export of palm oil in Indonesia to several destination countries, especially in export activities and there is still little that examines Indonesian exports to countries, especially in Asia, apart from that research arises the inconsistency of the determining factors influencing the value of exports in Indonesia. Therefore, the purpose of this study is to look at the amount of production, the international trade price index and the rupiah exchange rate to destination countries on Indonesian palm oil exports.

This research will provide an overview to investors in knowing "Determinants of Production Amount, International Trade Price Index (IHPI) and Rupiah Exchange Rate Against Palm Oil Exports in Indonesia in 2007-2021". Thus, the completion of this research will provide information to both domestic and foreign investors, both private and government, to pay more attention to the highest determining factors so that later Indonesia's vision of becoming the largest palm oil producer on the international market and becoming a leader in the leading export commodity industry can be realized.

RESEARCH METHODOLOGY

Research that has been carried out using a quantitative approach accompanied by secondary data is then adjusted to obtain the required data through conclusions from hypotheses (Jamilah et al., 2021). The type of data in this study is in the form of time series data with the last 15-year period from 2007 to 2021 in 1 destination country for palm oil exports, namely Malaysia. Data sources obtained from the official website of

the Central Bureau of Statistics and Investing.com. The dependent variable used is the Export of Palm Oil in Indonesia in 3 destination countries, the independent variables of the study are Production Amount, International Trade Price Index (IHPI) and Rupiah Exchange Rate. For the application of research data using the Eviews 9 application to make it easier to analyze data (Winarto, 2015).

The analytical method used in this study is multiple linear regression data. The research is in the form of multiple linear regression data with the following equation:

$$\gamma = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

That is :

γ	= Export of palm oil in 1 destination country
	= Constant
β_1- β_3	= Regression coefficient
X_1	= Number of Production
X_2	= Indexinternational trade price (ihpi)
X_3	= Rupiah exchange rate
e	= Error

The following is also data released by the Central Bureau of Statistics regarding Total Production, International Trade Price Index (IHPI) and Exchange Rates for Exports of Destination Countries, namely Malaysia from 2007 to 2021, that Indonesia will export palm oil to these various destination countries.

Table 1. Production Amount, International Trade Price Index, and Rupiah Exchange Rate to Destination Country Exports (Malaysia)

Year	Production amount	International Trade Price Index	Rupiah exchange rate	Destination Country Exports Malaysia
2007	2041	1437300,5	9830	373
2008	19401	667885	10950	321
2009	21391	1188416	9400	1793
2010	22497	1368415,5	8991	2634
2011	23976	1479979,25	9068	3232
2012	26016	1373347,15	9670	5302
2013	27782	1472063.02	12189	6470
2014	29278	796756.73	12440	6250
2015	31070	554005,43	13795	3186
2016	31731	803487,35	13436	1174
2017	34940	903698,92	13548	2100
2018	42884	679195,1	14481	1887

2019	47120	913271.37	13901	3067
2020	48297	725711,21	14105	3957
2021	46223	1124912,21	14269	2512

Source: Central Bureau of Statistics

RESULT AND DISCUSSION

Included observations: 15

Variables	coefficient	std. Error	t-Statistics	Prob.
C	-1342918	6499686	-0.206613	0.8401
JP	0.073665	0.069128	1.065628	0.3094
IHPI	0.002353	0.002210	1.064973	0.3097
NTR	-0.030761	0.499883	-0.061537	0.9520

Source: Results of Eviews 2023 Data Processing

Multiple Linear Regression Analysis

From the table above shows that in general the results of the analysis of multiple linear regression, the equation can be written as follows:

$$\gamma = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$
$$\gamma = -1342.918 + 0.073665\ JP + 0.002353\ IHPI - 0.030761\ NTR$$

A constant value of -1342.918 means that if the total of the variable X1 (JP) at the total production level is worth 0.073665, X2 (IHPI) at the international trade price index level is worth 0.002353, and X3 (NTR) at the rupiah exchange rate is -0.030761 is 0 The magnitude of the regression coefficient of the variable X1 (JP) is 0.073, meaning that if the value of the total production level increases by 1% while the values of other variables remain the same, the value of Y (Exports) will increase by 0.073. the coefficient is positive, meaning that there is a positive relationship between JP and exports. The higher the JPthe export value will increase. The regression coefficient of the X2 variable (IHPI) is 0.002, meaning that if the value of the International Trade Price Index level increases by 1% while the variable value remains constant, then Exports (Y) will increase by 0.002. The coefficient is positive, meaning that there is a positive relationship between the number of IHPI and the export of palm oil (Y). The regression coefficient of variable X3 The Rupiah Exchange Rate (NTR) is -0.030, meaning that if the value of the NTR variable increases by 1% and the value is constant, exports (Y) will increase by -0.030. The coefficient is negative, meaning that there is a negative relationship between the Rupiah Exchange Rate (NTR) and the Export of Palm Oil (Y).

Classic assumption test

After carrying out various classic assumption tests using Eviews, the following results are obtained:

Normality test
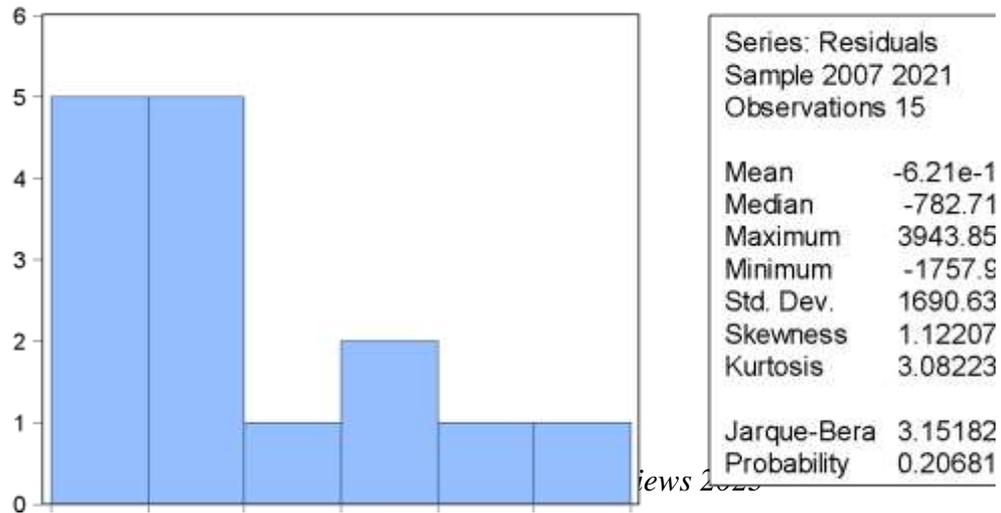
It is known from the histogram image of the normality test results above that it has been explained that the probability value of 0.206819 0.05 is stated to be normally distributed because the probability value is greater than the degree of error value of 0.05.

Heteroscedasticity Test

Heteroskedasticity Test: Glejser

F-statistics	0.695598 Prob. F(3,11)	0.5738
Obs*R-squared	2.391870 Prob. Chi-Square(3)	0.4951
Scaled explained SS	1.451530 Prob. Chi-Square(3)	0.6935

Variables	coefficient	std. Error	t-Statistics	Prob.
C	-2297602	3267731	-0.703118	0.4966
JP	-0.044814	0.034754	-1.289448	0.2237
IHPI	0.000826	0.001111	0.743572	0.4727
NTR	0.347259	0.251317	1.381755	0.1945

Source: Results of Eviews 2023 Data Processing

It can be seen that the heteroscedasticity test on the variables X1 (JP), X2 (IHPI), and X3 (NTR) has a Chi-Square probability value by applying the Glejser test of 0.2237, 0.4727 and 0.1945. Where the three values are higher than 0.05, then H0 is rejected, meaning that the data in this study has no heteroscedasticity problem and meets the classical assumptions. The test states that the three variables have a probability value of 0.6935, meaning that the ci square probability value has no relationship in the heteroscedasticity test.

Multicollinearity Test

Variance Inflation Factors
Date: 01/29/23 Time: 10:01
Sample: 2007 2021
Included observations: 15

Variables	coefficient Variances	Uncentered VIF	Centered VIF
C	42245923	174.1966	NA
JP	0.004779	20.94783	2.845647
IHPI	4.88E-06	23.53082	2.065436
NTR	0.249883	152.8143	4.321282

Source: Results of Eviews 2023 Data Processing

It can be seen from the table above that the Contered VIF value for each independent variable (X1 is 2.845647, X2 is 2.065436 and X3 is 4.321282) is less than 10, so H0 is rejected so that the variables at the Total Production level, the International Trade Price Index level, and the Exchange Rate level Rupiah is free from multicollinearity conditions. Therefore, it can be concluded that there is no multicollinearity.

Autocorrelation Tes
Durbin Watson

Durbin-Watson stat 1.420507

Based on the test results, the Durbin Watson stat value was 1.420507 proving that the autocorrelation in the study was positive. If the Durbin Watson Stat value is between dU < DW < 4-dU then it is free from autocorrelation. So the Durbin Watson stat value of the research test is in the interval 1.10-1.54, meaning without conclusions from autocorrelation.

Coefficient of Determination R-square (R2)

Regression Statistics	
multiple R	0.449864
R Square	0.202377
Adjusted R Square	-0.01516
Standard Error	1907,296
Observations	15

Source: Results of Eviews 2023 Data Processing

Based on the results of statistical calculations in the multiple correlation analysis (R) or Multiple R, a value of 0.449 was obtained, this has proven that there will be a very strong relationship between the variables JP (X1), IHPI (X2) and NTR (X3) with palm oil exports in Indonesian territory. In addition, the determinant (R2) also obtained a result of 0.2023 or 20.23%, meaning that the percentage of the independent variable can influence the dependent variable, namely exports of palm oil by 20.23%, this value is a percentage close to the perfect number. While there is a remainder of R Square and Adjusted R Square of 21.75 in the palm oil export variable influenced by other variables which of course will not be discussed in this study. Adjusted R Square is usually used to discuss the variables that affect the level of exports of palm oil in the Indonesian region. Then there is the Standard Error which has a result of 1907.296 which predicts the calculation error in this study.

F test

ANOVA

	F	Significance F
Regression	0.930327	0.458514172
residual		
Total		

Source: Results of Eviews 2023 Data Processing

	Coefficients	t Stats	P-values
Intercepts	-1342.92	-0.2066127	0.840087
X Variable 1	0.073665	1.06562753	0.309423
X Variables 2	0.002353	1.06497311	0.309707
X Variables 3	-0.03076	-0.0615366	0.952036

The F test was conducted to find out whether the independent variables (X1, X2, and X3) simultaneously affect the dependent variable (Y), the calculated F value is 0.930327 while the F table value can be seen using a 95% confidence level at a = 5% , df 1 = 3 and df 2 (nk-1) or 15-3-1 = 11, the results obtained are F table of 3.587434so that the variable amount of production, the international trade price index and the rupiah exchange rate simultaneously influence the export of palm oil. This is because the calculated F value < F table (0.930327 < 3.587434) with a significance value of more than 5% (3.587 > 0.05)

T test

In the results of the T test on the variable X1 (Amount of Production) has a value of 1.065 while X2 (International Trade Price Index) has a value of more than the number of degrees of freedom = 0.05 and X3 (Rupiah Exchange Rate) has a value of less than 0.05 but in the variable value X1 and X2 contain a positive element, meaning that the three independent variables have a variable that has an influence but is not significant on the export of palm oil in Indonesia to Malaysia with proof through t count and t table. The following is evidence of the results of the t test in order to find out the validity of the three variables in the study:

T table with degrees of freedom (df) n -k-1 or 15-3-1 = 11 and it can be seen that the t table reaches a number of 2.200985. The size of the JP variable in t count < t table (1.065 < 2.200) then in the IHPI variable there is t count < t table (1.064 < 2.200) and the NTR variable has t count > t table (-0.061 < 2.200) so that from the three variables a conclusion is drawn prove that the JP and IHPI variables have a positive but not significant effect and the NTR variable has a negative but not significant effect caused by a negative coefficient, of course it will have an effect on the probability of the three variables, especially in the negative NTR variable, it can be seen from the coefficients where the two still have continuity with each other .α=5%

Discussion

The Influence of Total Production on Palm Oil Exports in Indonesia to Malaysia

After going through various stages of multiple linear regression testing, researchers have succeeded in obtaining valid evidence that the level of total production has a not significant positive effect on exports of palm oil in Malaysia because if the amount of production increases, of course, exports of palm oil will increase. This can happen because palm oil in Indonesia is not superior in terms of the quality of palm fruit for export in Malaysia so it often happens that a lot of young fruit is found to be harvested. In addition, there is still minimal maintenance of palm oil plantations which has resulted in the number of palm fruit products not growing much and receiving little support from the Indonesian government compared to other destination countries in 2007 to 2021. despite the lack of support, the government has prepared a palm oil plantation management program to improve the performance of the palm oil sector in Indonesia, to meet domestic consumption. Even though palm oil is not yet ripe and several palm oil managers are ready to harvest the fruit, this does not become an obstacle for the Indonesian state in exporting activities to Malaysia. So that the amount of production that has a not significant positive relationship with palm oil exports can be influenced by immature fruit, lack of support and care from the government. Even though palm oil is not yet ripe and several palm oil managers are ready to harvest the fruit, this does not become an obstacle for the Indonesian state in exporting activities to Malaysia. So that the amount of production that has a not significant positive relationship with palm oil exports can be influenced by immature fruit, lack of support and care from the government. Even though palm oil is not yet ripe and several palm oil managers are ready to harvest the fruit, this does not become an obstacle for the

Indonesian state in exporting activities to Malaysia. So that the amount of production that has a not significant positive relationship with palm oil exports can be influenced by immature fruit, lack of support and care from the government.

The Effect of International Trade Price Index on Palm Oil Exports in Malaysia

Based on the results of significant hypothesis testing or the T test, it was found that international prices had a positive but not significant effect on the level of palm oil exports. If international prices increase, a country will become an exporter and vice versa. Indonesian palm oil producers prefer to sell goods and services to buyers from other countries because they get a large enough profit so that the Indonesian state takes the initiative to sell palm oil products to Malaysia. This is because the two countries agreed to enter into a previous contract agreement between the importing country and the exporting country aimed at increasing export volume and the agreed price so that prices that occur, whether rising or falling, do not affect the export of Indonesian palm oil. International prices directly or indirectly affect the export of Indonesian palm oil to Malaysia which will not have a significant effect on the international price of Indonesian palm oil exports in the international market.

The Effect of the Rupiah Exchange Rate on Palm Oil Exports in Malaysia

The results of statistical tests conducted in this study stated that the rupiah exchange rate had a negative but not significant relationship to Indonesia's palm oil exports. If the exchange rate of the country's currency experiences a depreciation, it will have an impact on the domestic market so that prices become more affordable compared to other countries. Under these conditions, palm oil exports increase. The rupiah exchange rate was overvalued which was too far above the equilibrium level in 2012 to 2015. However, the condition of the rupiah exchange rate changed very drastically to below the equilibrium level falling from 2016 to 2021 due to aggressive monetary policy in developed countries where developed countries raise interest rates.

CONCLUSION

1. Based on the results of the study through the F test or simultaneous test, it shows that the variable level of production, the international trade price index has a positive and insignificant effect on exports of Indonesian palm oil in Malaysia while the exchange rate variable has a negative and insignificant effect

2. The production level variable has no significant effect on exports of Indonesian palm oil to Malaysia. It has been shown in the T test that during the course of the study there was a positive relationship where there were still many palm oil exporters who paid little attention to harvesting SOPs and the lack of protection from the government so that palm oil production was less than optimal for export activities. Therefore, if the amount of production increases, it can reduce the number of exports of palm oil to increase and vice versa

3. During the research period through the stages of data processing and statistical analysis testing with multiple linear regression showed that the international trade price index has a positive but not significant effect. This indicates the existence of

a contract agreement between the two countries, Indonesia and Malaysia, to increase palm oil export activities and any increase or decrease in international trade prices will always be followed by palm oil export activities.

4. Based on the partial test or T test it has been proven that the rupiah exchange rate has a negative but not significant effect on exports of Indonesian palm oil to Malaysia. It can be seen that the rupiah exchange rate in highly depreciated conditions can affect the domestic market and overvalue will occur. so that if the currency exchange rate depreciates by 1 USD against the Rupiah, then the export level of palm oil will increase, and vice versa.

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