



FACTORS AFFECTING INDONESIAN NATURAL RUBBER EXPORT PRICES

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ABSTRACT

Since 2012, the volume and value of Indonesian rubber export have declined significantly due to lower international rubber prices. This drop in worldwide rubber prices has an impact on declining Indonesian rubber export prices. In addition to the international rubber price, several factors may influence natural rubber export prices. The study's goal is to assess the impact of Indonesia's natural rubber expor volume, international rubber prices, currency rates, and rubber export pricing on Indonesia's natural rubber export price over the proceeding period. The data utilized for this study includes 28 years, from 1992 to 2019. The study's finding show that the independent variables in this study include the export price of natural rubber throughout the same time period. The export price of natural rubber is influenced by factors such as export volume, international rubber price, currency rates, l and historical rubber export prices. This shows that each of independent variables in this study has a significant impact.

INTRODUCTION

Natural rubber is rubber obtained from tapping rubber sap from trees (Mawardi et al., 2021). Natural rubber is a crude substance for many businesses so it has considerable market in international trade (Purwaningrat et al., 2021). Indonesian natural rubber is traded in semi-finished forms such as *ribbed*

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smoked sheet (RSS), concentrated latex, and *technically specified rubber* (TSR),. Rubber is an export commodity vital to the Indonesian economy (Syarifa & Tistama, 2020). Rubber is a plantation commodity that is a source of income and employment opportunities, and it is a large foreign exchange contributor for Indonesia (Parmadi et al., 2018).

Indonesia is the world's second largest rubber producer after thailand. Indonesia, along with Thailand Malaysia, is the world's largest producer of raw rubber (Claudia et al., 2016; Sembiring et al., 2021). Land area and rubber production in Indonesia have increased since 2010 by 0.75 and 2.75% per year respectively (BPS, 2022). The increase in land area and rubber production has not been matched by the volume and value of rubber exports, which have tended to decline (Novriana & Antoni, 2023).

The volume and value of Indonesian rubber exports from 2000-2020 have fluctuated but tends to experience decline was large, with an average annual decline of 1.06. The same thing happened with the value of rubber exports, which experienced a more significant decline than the decline in export volume. namely an average of 8.06% per year (BPS, 2022).



Figure 1 Volume and export value of natural rubber from Indonesia in 2010-2020 Source: Directorate General of Plantations, 2010-2020 (processed)

The reason for the decline in Indonesia's rubber exports since 2012 is that due to the global financial crisis, The price of natural rubber on the international market has decreased (Siburian, 2012; Silaban et al., 2020). Since 2011, international rubber prices have been under significant pressure due to a variety of factors, significantly when economic activity weakened, and due to the downturn in the rubber-intensive automobile industry, there is an ample supply of natural rubber in the rubber in the international market (Sujono & Aryani, 2022). The decline in international rubber prices will also have an impact on Indonesian rubber export prices (Andelia & Antoni, 2022). International rubber prices fell sharply from 2011 to 2014. Previously, the price of rubber was US\$ 4.5 per kg, which fell to USD 1.6 per kg in mid-2014. It was even recorded that at the end of 2018, the rubber price was USD 1.35 – 1.44, even though it had risen to USD 2.7 in the previous year.



Figure 2 Indonesian Rubber Export Prices Source: UN Comtrade, 2020

Indonesian natural rubber is exported to countries around the world. There are five countries with the significant export volume, namely, the Japan, South Korea, India, United States, and China (BPS, 2020). The United States has the most is significant export extent of Indonesian natural rubber, 450 thousand tons. Japan is second with a total export volume of 388 thousand tons, followed by China, India and South Korea w each with a complate quantity of 330 thousand lots. Indonesia's total export volume was 2.2 million tonnes in 2020, 189 thousand tonnes and 150 thousand tonnes.

Based on the data gathered, the export charge of Indonesian natural rubber destined for the US and Japan has similar movements. There has been a significant decline in prices since 2012. Howover, the export price of rubber experienced an increase in 2017 but again experienced a decline in the following year with a decrease of 17 .84% and 18.13% in 2018. The decline in rubber prices affects the volume of rubber exports themselves, the higher the price of rubber, the higher the quantity of rubber supplied (Tarigan et al., 2021; Fihri et al., 2021).



Figure 3 Destination Country for Indonesian Natural Rubber Exports Source: Central Statistics Agency, 2020

Apart from international rubber prices, other factors are estimated to influence the cost of rubber export from Indonesia, and especially how much rubber is exported from Indonesia. The quantity of Indonesian rubber exports will affect the quantity of rubber provided to the arena marketplace (Perdana, 2020). (Purnomowati et al., 2015) apart from international prices, export prices in the previous period were additionally stimulated the price Indonesian natural rubber is exported for.

Based primarily on this context, it is imperative that this research that this research be conducted in order to investigate the effects on the prise of Indonesian natural rubber export of the volume of exports, the global rubber change, the exchange rate of the rupiah, and the fee of Indonesian natural rubber exports during the period.

RESEARCH METHODS

Method of Collecting Data

The statistics used in this research is secondary data in the shape of time series statistics from 1992-2019 or for 27 years. Data on Indonesian rubber export prices used in this research uses Technically Specified Rubber (TSR) prices with HS code 400122. This research uses various related data collected from various sources. The following types and sources of facts are used in the studies:

J1		
Data Type	Unit	Data source
Indonesian natural rubber export prices	IDR/kg	Worldbank
Indonesia's natural rubber export volume	ton/year	UN Comtrade
International rubber prices	USD/kg	Worldbank
Exchange rate	IDR/USD	UN Comtrade

Table 1. Data Types and Sources

Data Analysis Method

The data evaluation technique used to reply the goals of this studies is Ordinary Least Square (OLS). This method measure the magnitude of the influence of the volume of Indonesian natural rubber exports (X1), international rubber prices (X2), the rupiah exchange rate (X3) and the price of Indonesian natural rubber exports in the previous period (X4) the dependent variable, which in this study is the price Indonesian natural rubber exports (Y).

The Fixed Effect Model equation in this research is formulated as follows:

$$Y_{t} = \beta_{0i} + \beta_{1}X_{1t} + \beta_{2}X_{2t} + \beta_{3}X_{3t} + \beta_{4}X_{4t(y-1)} + \mu_{it}$$

Where:

Y _{it}	: Indonesian natural rubber export prices (IDR/kg)
β_{0it}	: Constant value
X ₁	: Indonesia's natural rubber export volume (ton)
X ₂	: International rubber prices (USD/kg)
X_3	: Rupiah exchange rate (IDR/USD)
$X_{4(y-1)}$: Indonesian natural rubber export prices in the previous period
	(IDR/kg)

From the model above, the statistical hypothesis is as follows:

 H_0 : The unbiased variable has no bearing on the dependent variable

H₁ : The independent variable has an impact on the dependent variable

The data will be processed using Microsoft Excel 2010 and E-views version 12 software, and then the processed output will be interpreted manually.

RESULTS AND DISCUSSION

Natural Rubber Export Model Estimation

Earlier than estimating prior to applying the Ordinary Least Square (OLS) approach, the classical assumptions must be tested. The traditional assumption test is needed because the equation model to be analyzed needs to meet the BLUE (Best Linear Unbiased Estimator) requirements, or you could say it must be free from classical assumptions (Rapitupulu et al., 2021). The classical assumption tests that will be carried out include multicollinearity, normality, heteroscedasticity, and autocorrelation tests. Based totally at the consequences of the classical assumption check of the equation model on this studies, the subsequent aoutcomes had been acquired:

Multicollinearity Test

Carrying out a multicollinearity test aims to find out whether there is a relationship between the independent variables in the research. Multicollinearity can be identified through the VIF value of the variance inflation factors, where the equation model free from multicollinearity has a VIF value <10 (Ningsih & Dukalang, 2019).

Based on VIF values obtained for all independent variables in this study, such as the export volume of natural rubber (X1), the foreign rubber price (X2), the exchange rate for the rupiah (X3), and the export price of Indonesian natural rubber in the previous period (X4), it can be concluded that the model of equations is without multicollinearity assumptions. Every one of these numbers was below 10.

Normality Test

To ascertain the independent variable, the normalcy test is required has a normal distribution (Gun, 2020). The normality of the data can be determined through the Jarque Bera Test. If the Jarque Bera probability value is greater than the precise level employed in the study, the equation model is deemed to be normality-free. The Jarque Bera probability value is 0.746160 > 0.005, which indicates that the research equation model is free of normalcy assumptions. This study employs an actual level of 5%.

Autocorrelation Test

The purpose of the autocorrelation test is to determine whether coufounding errors in period t-1 (before) exist in the equation model employed in the research. The LM test value can be used to test for autocorrelation. It is said to be free of autocorrelation if the Obs*R-Squared chi2 probability value is > real level (Ningsih & Dukalang, 2019).

Based on the results of the autocorrelation test via the LM test, it is known that the Obs*R-Squared chi2 probability is 0.3211 > 0.05 (real level) so it can be said that the equation model is free from autocorrelation assumptions.

Heteroscedasticity Test

The heteroscedasticity test is used to determine whether there are differences in residual variance among the study variables. Heteroscedasticity can be identified by comparing the observation's chi2 probability value with the confidence level used in the research (Gun, 2020). If the chi2 probability value is > 0.05, then the observation is declared free from heteroscedasticity assumptions.

The real level used in this research is 5%, so it is known that the probability of chi2 (0.1426) > 0.05 means that the equation model for this research is free from heteroscedasticity assumptions.

The conventional assumption test outcome showed that the equation model in this study was free from classical assumptions. After being free from classical assumptions, the data will then be estimated to see how the amount of Indonesian exportation of raw rubber, international rubber prices, the rupiah exchange rate and the price of Indonesian natural rubber exports in the previous period. Based on the estimation results, it is known that:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	-7070 997	1028.959	-6.871991	0.0000
×1	-0.000422	0.000154	-2.741194	0.0116
×2	0.544279	0.093692	5.809248	0.0000
×з	0.046767	0.019768	2,365735	0.0268
×4	1135.001	173.7858	6.531038	0.0000
R-squared	0.968684	Mean dependent var		1574.750
Adjusted R-squared	0.963238	S.D. dependent var		964.5123
S.E. of regression	184,9310	Akaike info criterion		13,43828
Sum squared resid	786587.9	Schwarz criterion		13.67617
Log likelihood	-183.1359	Hannan-Quinn criter.		13.51100
F-statistic	177.8615	Durbin-Watson stat		1.587765
Prob(F-statistic)	0.000000			

Table 2.Estimated results examination of the variables affecting the natural
rubber export price from Indonesia

α=5%

Source: processed data, 2022

Coefficient of Determination (R²)

The study independent variable is Indonesia natural rubber export price. The volume of natural rubber shipped, the price of rubber internationally, the exchange rate between the US dollar and the Indonesian rupiah, and the price at which natural rubber was exported from Indonesia in the provious period are the dependent variables. The percentage change in the independent variable is determined using the coefficient of determination.

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It is known from the analysis that the 0.968684 is the R-squared. This indicates that 96.8% of the variation in Indonesian natural rubber export prices is explicable in terms of the independent variable, which is made up of the amount of natural rubber exported from Indonesia, global rubber prices, the value of the rupiah, and the cost of those shipment in the prior period. While factors not included in the research equation account for the remaining 3.7%.

F Test

In this study, the amount of Indonesian exportation of raw rubber, international rubber prices, the rupiah exchange rate, and the cost of Indonesian natural rubber exports in the preceding period are independent variables. The F test is requared to ascertain whether these variables simultaneously have a significant effect on the dependent variable, which is Indonesian natural rubber export prices.

The F test result show that the Prob (F-Statistic) value obtained is p (0.000) < 0.05 (5% significance level), which suggests that the independent variables in this reseach equation model simultaneously have a real effect with a significance level of 5% on the natural rubber export pricing from Indonesia.

t-Test

The partial influence of an independent variable on a dependent variable, or the combined influence of all the independent variables in this study on the dependent variable, is ascertained using the t-test. Since 5% is the alloweble error level (significance level) in this study, the independent variable with a Prob value is the one that actually affects the dependent variable. t-statistic is less than 0.005.

After carrying out data regression analysis, the following equation results were obtained:

$Y_t = -7070.99 - 0.0004X_{1t} + 0.5242X_{2t} + 0.0467X_{3t} + 1335.0X_{4t-1} + \mu_t$

Based on the equation above, it is known that all independent variables (Indonesian natural rubber export volume, international rubber prices, rupiah exchange rate, and Indonesian natural rubber export prices in the previous period) in this research have a significant effect at the 5% real level on Indonesian natural rubber export prices. The outcomes of the study are consistent with the research results (Parmadi et al., 2018), It claims that the regression equation indicates that the amount of natural rubber exported from Indonesia is significantly influenced by rubber output, global rubber price, and exchange rates.

Determinant of Natural Rubber Export Price: Discussion

Rubber Export Volume

The t-test analysis outcomes demonstate that the export volume significantly affects cost for raw rubber exported from Indonesia, as indicated by the possibility fee of 0.0166 < 0.055 (α =5%). There is a little correlation between the volume of rubber exported from Indonesia and the export rate of natural rubber from the country This will be visible from the coefficient price of is 0.000422, meaning that each increase in Indonesian natural rubber export with the aid of 1 ton will lessen the export rate of Indonesian natural rubber 0.0004 IDR/kg.

The increase inside the quantity of trade from Indonesia and the total supply of Indonesian raw rubber will influence the quantity of rubber provided inside the worldwide market. The extra rubber in the worldwide market will inspire a decrease in internasional rubber prices, which will then be transmitted to the export charge for raw rubber from Indoensia. Changes in the amount of domestic rubber production will be felt in the domestic rubber supply (Suryanto, 2016). The outcomes of this studies are bolstered by means of studies effect (Alfi Nurdina et al., 2021) Over time, the abundance of natural rubber will result in lower prices.

International Rubber Prices

The effects of the t-test evaluation show that export volume has a actual influence on the raw rubber export fee from Indonesia as seen from the chance price of 0.0000 > 0.055 (α =5%) with a coefficient cost of 0.544279. Which means that for every growth in the global rubber charge of one USD assuming cateris paribus, the export fee of Indonesian natural rubber will growth through 0.544 USD.

International rubber prices have a fine courting with Indonesian natural rubber because an increase in international rubber prices will stimulate producers to export, thereby increasing the cost of Indonesian natural rubber (Kurniawati et al., 2016; Chadhir, 2015). (Purnomowati et al., 2015) stated that there is strong long-term and short-term integration between international rubber prices and Indonesian natural rubber export prices. Indonesian rubber prices compared to their export supply (Atika & Afifuddin, 2013).

1. Effect of Exchange Rates

Changes in exchange rates will influence the amount of export supply and import demand which will ultimately impacting export prices. The cost of one currency unit in terms of another currency unit is known as the price of exchange (Fauji, 2016). Depreciation of the exchange rate will raise the price of raw rubber exports on the world trade that will then influence the behavior of producers in exporting countries to increase the amount of export supply (Tweeten, 1992).

The likelihood value of $0.0268 > 0.055 \alpha=5\%$) with a coefficient value of 0.46767 indicates that export volume has a substantial affect on the natural rubber export price from Indonesia, as indicated bt the t-test study findings. Accordingly, with each one percent increase in the exchange rate Rp/USD, assuming ceteris paribus, the export price of Indonesian natural rubber will increase by Rp. 0.46.

The exchange rate will also influence producers' decisions when determining their exports. The exchange rate is one of the factors that influences exports. The price of a currency in relation to activities on the money and stock markets is kwonn as the exchange rate (Panjaitan et al., 2021). The studies findings are consistent with research (Alfi Nurdina et al., 2021) that claims the long-term formation of rubber prices is affected by the exchange rate between rupiah versus the US currency. The price between the rupiah and dollar will decline as a result of the exchange rate increase mentioned in the research findings. Exporters will be encouraged to the export if there is a decline in the value of the rupiah when converting dollars to dollars, as this will result in a greater price for them (Ginting, 2013).

Indonesian Natural Rubber Export Prices in the Previous Period

The probability value of 0.0000 < 0.055 (α =5%) indicates export fee of natural rubber from Indonesia prossessed a substantial impact on the export price of that rubber in the preceding period, in accordance with the t-test result study. There was a farable correlation between the cost of Indonesian raw rubber export and its export price during the preceding period. As can be seen from the coeficient value of 1135.00, an increase of 1 Rp in the cost of Indonesian raw rubber export will result in an increase of 1DR 0.0004/kg in the export price of that same rubber.

CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

Primarily based on panel data regression avaluation, it is recognized that simultaneously the unbiased variables on this observe impact the shipment rate of Indonesian raw rubber. In comparison in part the factors that posses real influence on the raw rubber export price from Indonesia are the volume of Indonesian natural rubber export, global rubber cost, exchange charges, and export costs. Indonesian natural rubber within the preceding period. Partially, the extent of raw rubber export from Indonesia has a poor courting with the export rate of Indonesian raw rubber. Global rubber fees have a affective connection to the fee of Indonesian raw rubber because growing global rubber charge will inspire manufacturers to export for you to increase the charge of Indonesian natural rubber. Adjustments in value that is an alternate factor on the way to have an impact on the quantity of export supply and import demand in an to in the long run have an impact on export charges. The price of Indonesian natural rubber is influenced by various factors so it is necessary to intervene from the government from the supply side to help export prices remain maintained so that offers from the farmer side remain available because the decline in rubber export prices will affect domestic prices which will ultimately affect domestic demand for rubber.

Suggestion

This research has not included domestic natural rubber consumption as a research variable, so future research can include this variable as an independent variable.

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