BOOSTING INDONESIAN RUBBER EXPORT: A STRATEGY FOR GLOBAL SUCCESS

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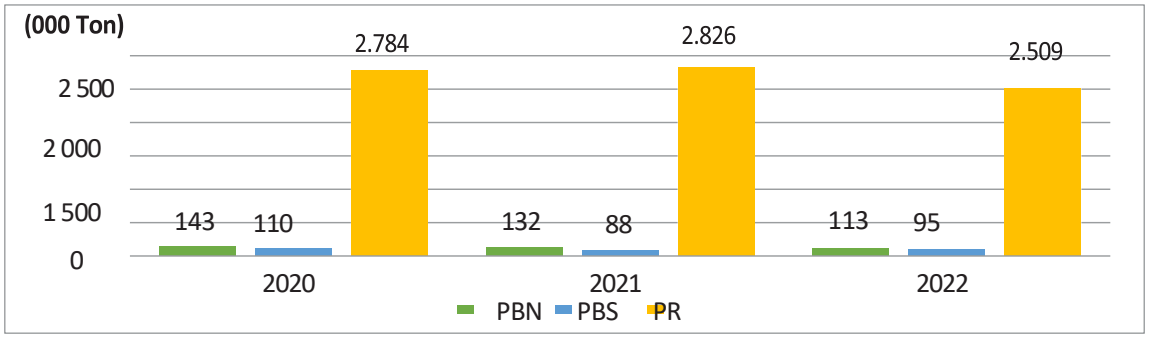
ABSTRACT

Indonesia is one of the world's largest rubber producers, making it a crucial export commodity for the Indonesian economy. Even though rubber production has increased, rubber exports often experience fluctuations, indicating instability in rubber export performance. This research aims to analyze the role of rubber production and the impact of the exchange rate on rubber exports using the ARDL model, as well as evaluate the effectiveness of government policies regarding rubber exports. The rupiah exchange rate affects the competitiveness of rubber exports. On the other hand, rupiah depreciation can make exports more competitive, although there are several cases where rupiah appreciation does not have a negative impact on exports. The results of the analysis show that in the short term, the rupiah exchange rate has a significant influence on rubber exports, while in the long term, rubber production is the most influential factor. Therefore, efforts and policies must combine increasing production with increasing added value. Government policies regarding rubber exports have developed over the last 30 years and shown progress in increasing competitiveness and added value. However, the main challenge is to turn the increase in export performance into an increase in the welfare of rubber farmers. Existing policies need to be continued with adjustments, especially focusing on empowering small farmers. A holistic approach that includes increasing production capacity, market access, market risk protection, as well as technology and financing for rubber farmers, will be the key to improving farmer welfare and optimizing Indonesian rubber exports in the dynamic global market.

Keywords: Rubber, Export Optimization, ARDL

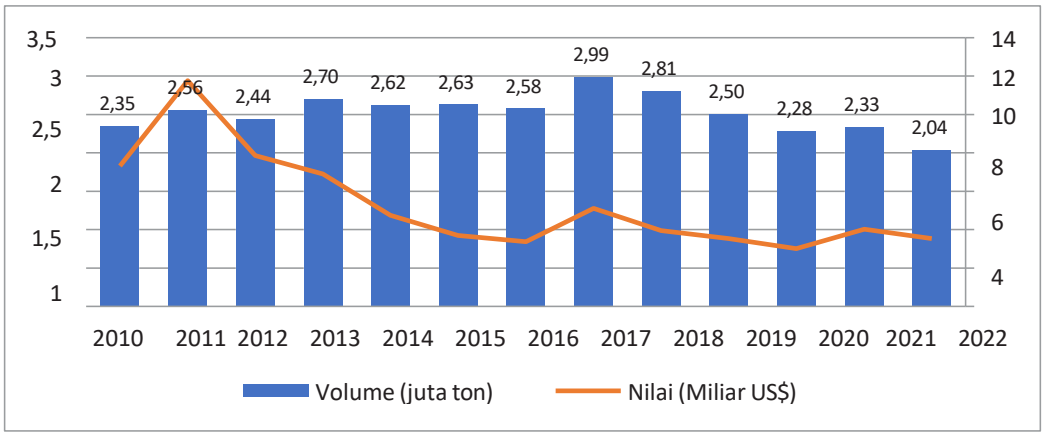
1. INTRODUCTION

Rubber is one of Indonesia's leading commodities, playing an important role in the economy. Indonesia is one of the largest rubber producers in the world due to its favorable climate and soil conditions for rubber tree cultivation, enabling abundant rubber production. Regions such as Sumatra, Kalimantan, and Sulawesi are the main centers of rubber production in Indonesia. In addition, the rubber industry plays a significant role in contributing to Indonesia's Gross Domestic Product (GDP). Rubber also makes a significant contribution to the agricultural and processing sectors. The rubber industry also creates jobs for thousands of workers, both in the plantation sector and in processing. The following is a graph showing Indonesia's rubber production.



From the graph above (Figure 1.1), it can be seen that although rubber plays an important role in Indonesia's economy, rubber production remains highly fluctuating, preventing optimal profits from being achieved. The main causes are weather factors and plant diseases. However, these problems have persisted for several decades, and it is unfortunate that if these issues continue to be neglected without solutions, it will have significant negative consequences, as the potential rubber market is very promising for Indonesia.

Rubber production greatly determines the quantity of rubber exports. Currently, rubber is one of Indonesia's main export commodities. Rubber exports play an important role in foreign exchange earnings. Indonesia exports rubber to various countries worldwide, including China, the United States, Japan, India, and European countries. However, it is unfortunate that the potential profits from rubber exports have not been fully optimized. The following shows the condition of Indonesia's rubber exports over the past eight years.



From the image above, it is clearly seen that Indonesia's rubber exports continue to fluctuate and tend to decline. In addition to unstable production conditions, Indonesia's rubber exports are also facing detrimental issues such as falling rubber prices in both local and global markets. Natural rubber prices have experienced significant fluctuations in recent years, primarily due to varying global demand and competition with other rubber-producing countries. This price decline has negatively impacted the income of Indonesian rubber exporters and reduced the competitiveness of Indonesian rubber products in international markets. The following is a graph of Indonesia's rubber export volume.

The lack of diversification in Indonesian rubber products is also a key factor in the suboptimal pricing of Indonesian rubber in international markets. Currently, Indonesia still relies on exporting raw natural rubber materials, such as rubber sheets or rubber latex. The lack of product diversification increases the risk of price and global demand fluctuations, which can affect Indonesia's rubber industry. Moreover, regulatory and infrastructure challenges also affect Indonesia's rubber exports. Complicated licensing processes and slow bureaucracy can hinder companies' ability to efficiently export rubber. Additionally, poor transportation infrastructure, such as damaged roads or lack of port connectivity, can make it difficult to ship rubber to international markets in a timely manner.

Another issue that limits the profitability of Indonesia's rubber exports is competition with other countries. Although Indonesia is one of the largest rubber producers in the world, it faces competition with countries such as Thailand, Malaysia, and Vietnam. These countries have comparative advantages in terms of productivity per hectare and more advanced rubber processing technologies. This competition can affect Indonesia's share of the rubber export market and limit the growth of the rubber industry. To address the issues related to rubber exports mentioned above, it is necessary to analyze the policies that have been implemented to tackle Indonesia's rubber export problems. Then, a comprehensive and appropriate strategy must be formulated to optimize Indonesia's rubber exports.

The transformation of Indonesia's rubber exports is an interesting subject to study, as rubber is one of the plantation products that plays a significant role in Indonesia's economy. The fluctuating value of rubber exports from year to year indicates that export performance in the global market has not yet been optimal, making it necessary to research and analyze the factors causing these fluctuations. This study focuses on analyzing the influence of rubber production performance, and exchange rates on rubber exports in both the short and long term. Additionally, this research will examine the effectiveness of policies that have been formulated to optimize and enhance the competitiveness of Indonesian rubber in the global market.

2. LITERATURE REVIEW

2.1. The relationship between production and exports

The relationship between production and exports is often explained through the lens of classical trade theories, such as Ricardian comparative advantage and Heckscher-Ohlin theory. These theories suggest that countries tend to export goods in which they have a production advantage, whether due to technological superiority, resource availability, or factor endowments. According to this view, an increase in production capacity and efficiency in a particular sector, such as rubber, would naturally lead to an increase in export volumes. Therefore, improvements in productivity directly affect a country’s ability to supply international markets competitively (Krugman, 1980).

The positive relationship between production and exports across various sectors and countries. For instance, studies like those of Feder (1983) emphasize that export-oriented production promotes economic growth by generating foreign exchange and stimulating domestic industries through demand for inputs. Similarly, Balassa (1978) found that higher production in export sectors often leads to greater market shares in global trade, boosting overall economic performance.

In the context of rubber production and exports, Panitchpakdi and Clifford (2002) demonstrated that countries like Thailand and Malaysia, major competitors to Indonesia, successfully leveraged their production capacity to dominate global rubber markets. These countries adopted more efficient production technologies, which translated into higher export volumes and increased global market share. However, the relationship between production and exports is not always linear or positive. Chen (2009) points out that fluctuations in production, often caused by external factors such as weather conditions, plant diseases, and input shortages, can create volatility in exports. In the case of agricultural products like rubber, unpredictable environmental factors play a significant role in influencing production levels, which in turn affects the stability of exports. Jacks and Pendakur (2010) also highlight how global supply chain disruptions or domestic production inefficiencies can negatively affect export performance despite strong international demand.

Studies also indicate that the relationship between production and exports can differ in the short term versus the long term. Marquez and McNeilly (2008) suggest that in the short term, changes in production may not immediately translate into export growth due to factors like inventory levels, trade policies, or logistical delays. On the other hand, in the long term, consistent production growth is a key driver of sustained export performance. This is particularly relevant in sectors like rubber, where Indonesia's production challenges (weather, diseases, and technological inefficiencies) have led to fluctuating export performance despite strong global demand (Warr, 2008).

Another important aspect of the production-export relationship is the role of production competitiveness. Research by Porter (1990) emphasizes that competitiveness in production, driven by factors such as technological innovation, cost efficiency, and quality improvements, is critical to enhancing a country's export potential. In this regard, countries with higher productivity and better production capabilities tend to dominate export markets. For Indonesia, this highlights the importance of improving rubber production efficiency and diversifying its rubber products to increase its competitiveness in the global market (Napitupulu, 2016).

Rodrik (2008) notes that government policies supporting production growth—such as subsidies, technological upgrades, and infrastructure development—can positively impact export volumes. In Indonesia's case, policies aimed at improving production capacity and addressing the infrastructure and regulatory challenges that hinder the rubber industry would likely enhance export competitiveness (Sato & Yamagata, 2008).

2.2. The relationship between exchange rates and exports

The relationship between exchange rates and exports has been extensively studied in the field of international economics, given the crucial role that exchange rates play in determining a country's trade competitiveness. Exchange rates directly influence the prices of goods and services in international markets, affecting both the volume and value of exports. Understanding this relationship is particularly important for developing countries like Indonesia, where exports such as rubber play a significant role in generating foreign exchange.

The relationship between exchange rates and exports can be explained through several theoretical frameworks. Purchasing Power Parity (PPP) and the Marshall-Lerner condition are two central concepts in this area. The Marshall-Lerner condition posits that a depreciation of a country's currency can increase exports if the sum of the price elasticities of exports and imports is greater than one. In other words, when a country's currency weakens, its goods become cheaper for foreign buyers, thus increasing export volumes (Marshall & Lerner, 1943). Additionally, the J-Curve effect explains that currency depreciation may initially worsen the trade balance due to higher import costs, but over time, as exports become more competitive and foreign demand adjusts, export volumes increase, improving the trade balance (Magee, 1973).

Many empirical studies support the view that exchange rates significantly impact exports. Aghion et al. (2009) found that exchange rate volatility can affect export performance by creating uncertainty, thus influencing investment decisions in export-oriented sectors. In the context of developing countries, Reinhart (1995) argues that devaluation often leads to improvements in the trade balance, as a weaker currency makes exports cheaper for international buyers. This finding is supported by Edwards and Yeyati (2005), who noted that exchange rate devaluation can have a positive effect on export growth in emerging markets, including commodity-producing countries.

Although currency depreciation generally boosts exports, the impact of exchange rate volatility is more complex. McKenzie and Brooks (1997) studied this in the context of agricultural exports, showing that exchange rate volatility can negatively impact export performance, as seen in Indonesia's rubber exports. Since rubber prices are often set in US dollars, fluctuations in the rupiah can lead to unpredictable revenue, complicating export planning and profitability.

The relationship between exchange rates and exports can differ in the short term versus the long term. Bahmani-Oskooee and Rhee (1997) found that in the short term, currency depreciation may not immediately increase export volumes due to delayed adjustments and pre-existing contracts. However, in the long term, depreciation tends to have a more pronounced positive effect on export growth as companies adjust to new price conditions and foreign buyers increase demand.

Kandil and Mirzaie (2005) further explored how exchange rate changes affect the export sector over time, finding that in many cases, exporters benefit from currency depreciation only after adjusting their production and marketing strategies to accommodate exchange rate shifts. For Indonesia’s rubber

industry, Athukorala (2006) notes that the level of exchange rate pass-through is crucial in determining how exchange rate changes affect export performance. Since rubber prices are set in foreign currencies, fluctuations in the rupiah directly impact the competitiveness of Indonesia's rubber exports in global markets.

Exchange rate policy also plays a significant role in influencing export performance. Rodrik (2008) argues that government intervention in currency markets, such as through devaluation or managed float regimes, can help stabilize exchange rates and enhance export competitiveness. For developing countries like Indonesia, maintaining exchange rate stability is essential to protect the export sector from excessive volatility and ensure long-term trade growth. Similarly, Frankel and Wei (2007) highlight the importance of exchange rate management in commodity-exporting countries, where fluctuations in global prices are already a major concern. Well-managed exchange rate policies can help mitigate the adverse effects of global commodity price volatility and improve export stability.

3. METHODOLOGY

This research uses the Autoregressive Distributed Lag (ARDL) analysis method. The ARDL method is an econometric analysis method used to estimate short-term and long-term relationships between variables when these variables are non-stationary, meaning they have unit roots (Rahmasari et al., 2019). In general, the steps that will be taken for econometric analysis using this method are as follows: 1). Testing the stationarity of variable data in the research model, both at level level and first difference level. 2). Determination of optimum lag. 3). Granger causality test. 4). Bound test cointegration test. 5). Estimating ARDL models. 6). Test the stability of the ARDL model.
The ARDL model equation for this research is as follows:

$$EKS_t = \alpha + \alpha_{1t} + \sum_{i=1}^{p} \alpha_1 EKSt_{t-1} + \sum_{i=0}^{q} \alpha_2 Prod_{t-1} + \sum_{i=0}^{r} \alpha_3 ERI_{t-1} + ei$$

4. RESULTS AND DISCUSSION

Table 1. Stasionerity Test

Variabel	Unit Root	Augmented Dickey-Fuller	Critical Value 5%	Prob	Conclusion
Export	Level	-0.873324	-2.960411	0.7832	Not Stasionery
	First Diff	-7.783298	-2.963972	0.0000	**Stasioner**
Production	Level	-1.211018	-2.960411	0.6569	Not Stasionery
	First Diff	-4.143643	-2.963972	0.0031	**Stasioner**
Exchange rate	Level	-1.691668	-2.960411	0.4254	Not Stasionery
	First Diff	-5.731126	-2.963972	0.0000	**Stasioner**

Source: Processed data, 2024

Based on the Augmented Dickey-Fuller Root Test unit test table, it is known that all variables in this study are stationary at the first different level.

Table 2. Optimum Lag

VAR Lag Order Selection Criteria
Endogenous variables: Export-Production_exchange rate
Exogenous variables: C
Date: 25/07/24 Time: 18:34
Sample: 1990 2021
Included observations: 28

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-152.7740	NA	0.053952	11.26957	11.50747	11.34230
1	-72.10765	126.7615	0.001047	7.293404	8.720766	7.729762
2	-12.82231	71.98934*	0.000109	4.844451	7.461281	5.644442
3	11.62788	20.95731	0.000199	4.883723	8.690021	6.047346
4	81.24869	34.81040	3.49e-05*	1.696522*	6.692289*	3.223778*

Source: Processed data, 2024

The highest number of stars is in the fourth lag, which can then be concluded that the optimum lag is in the fourth lag.

Table 3. Granger causality test

Pairwise Granger Causality Tests
Date: 25/07/24 Time: 18:35
Sample: 1990 2021
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
Exchange rate does not Granger Cause EXPOR	28	0.84852	0.5120
EXPOR does not Granger Cause Exchange rate		0.99223	0.4357
PRODUKSI does not Granger Cause EXPOR	28	0.61642	0.6561
EXPOR does not Granger Cause PRODUKSI		0.76248	0.5625
PRODUKSI does not Granger Cause Exchange rate	28	0.23634	0.9144
Exchange rate does not Granger Cause PRODUKSI		1.54521	0.2294

Source: Processed data, 2024

The exchange rate variable does not significantly affect the export variable (Y) with a probability of 0.5120 > 0.05. Vice versa, the export variable does not significantly influence the exchange rate variable with a probability of 0.4357 > 0.05. Therefore, it can be concluded that there is no two-way causal relationship between the exchange rate variable (X4) and the export variable (Y) and vice versa. The production variable does not significantly affect the export variable with a probability of 0.6561 > 0.05. Vice versa, the export variable does not significantly influence the production variable with a probability of 0.5625 > 0.05. Therefore, it can be concluded that there is no

two-way causal relationship between the production variable (X1) and the export variable and vice versa.

Table 4. Bound test cointegration test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	3.789342	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
		Finite Sample:		
Actual Sample Size	27	n=35		
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
		Finite Sample: n=30		
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: Processed data, 2024

The results of the cointegration test using the Bound Test show that cointegration occurs where the F - statistic value is 3.789342 from I0 bound, F statistic > I0 bound at both 10%, 5% and 1% confidence levels. Then, it can be concluded that the variables in the model being tested are cointegrated so that there is a balance between the short term and the long term.

Estimating ARDL models

Table 5. Short Term ARDL Estimation Results

Date: 05/07/24 Time: 18:37
Sample (adjusted): 1995 2021
Included observations: 27 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): D(NILAI_TUKAR) D(PRODUKSI)
Fixed regressors: C
Number of models evalulated: 2500
Selected Model: ARDL (3, 4, 3, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D (EXPOR (-1))	2.014260	0.830444	2.425520	0.0723
D (EXPOR (-2))	1.665249	0.541870	3.073153	0.0372
D (EXPOR (-3))	0.610157	0.337690	1.806857	0.1451
D (EXCHANGE RATE)	**-13.29694**	4.111983	-3.233705	0.0319
D (EXCHANGE RATE (-1))	0.905854	2.279357	0.397416	0.7114
D (EXCHANGE RATE (-2))	10.01223	2.632589	3.803187	0.0191
D (EXCHANGE RATE (-3))	5.183966	1.329655	3.898731	0.0176
D (EXCHANGE RATE (-4))	-0.900807	0.676105	-1.332348	0.2536
D (PRODUCTION)	**-1.887167**	2.063853	-0.914390	0.4122
D (PRODUCTION (-1))	-0.810890	2.413333	-0.336004	0.7538
D (PRODUCTION (-2))	4.501172	3.607733	1.247646	0.2802
D (PRODUCTION (-3))	9.510653	2.845123	3.342792	0.0288
D (PRODUCTION (-4))	-5.345651	2.819922	-1.895674	0.1309
C	**-0.003670**	0.172973	-0.021217	0.9841

Source: Processed data, 2024

Short-term test results can be formulated as follows:

Ekspor = - 0,003670 – 1,887167*LnProduction – 13,29694*LnExchange rate

The interpretation of the equation is as follows:

1. Constanta -0.003670 means that if production, international prices, inflation and exchange rates are constant in the short term then exports will also be constant at -0.003670 percent.
2. Production -1.887167 means that if production increases by 1 percent in the short term, the level of exports will decrease by 1.887167 percent.
3. Exchange Rate -13.29694 means that if the exchange rate increases by 1 percent in the short term, exports will decrease by 13.29694 percent.

Table 6. Long Term ARDL Estimation Results

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (EXCHANGE RATE)	-0.578873	0.301205	-1.921861	0.1270
D(PRODUCTION)	-1.814202	1.181484	-1.535527	0.1995
C	0.001116	0.052734	0.021155	0.9841

Source: Processed data, 2024

EC = D(EKSPOR) -0.5789*D(NILAI_TUKAR) -1.8142*D(PRODUKSI) + 0.001

The interpretation of the equation is as follows:

1. Constanta 0.001116 means that if production, international prices, inflation and exchange rates are constant in the long term, then exports will also be constant at 0.001116 percent.
2. Production-1.814202 This means that if production increases by 1 percent in the long term, the level of exports will decrease by 1.814202 percent.

3. Exchange Rate = -0.578873 This means that if the exchange rate increases by 1 percent in the long term, exports will decrease by 0.578873 percent.

5. CONCLUSION

Performance of Indonesian rubber production has a negative and significant effect on the value of Indonesian rubber exports both in the short and long term. The exchange rate variable has a negative and significant effect in the short and long term on the value of rubber exports. The variable that most influences rubber exports in the short term is the exchange rate variable. while in the long term what influences the most is the production variable.

Government policy regarding Indonesian rubber exports has undergone significant evolution over the last 30 years. The policies implemented have shown positive developments in increasing competitiveness and added value. However, the main challenge remains in transforming improving export performance into improving the welfare of rubber farmers.

6. RECOMMENDATION

Existing policies deserve to be continued with some adjustments and additional focus on empowering small farmers. Increasing rubber farmers' income requires a holistic approach that focuses not only on production and export aspects, but also on increasing capacity, market access, and protection from market risks. The combination of increasing added value, stabilizing prices, and empowering farmers through access to technology, information, and financing will be the key to improving the welfare of Indonesian rubber farmers amidst complex global market dynamics. With proper implementation and ongoing evaluation, Indonesia's rubber export policy has the potential to not only increase the country's foreign exchange but also significantly increase the income and welfare of rubber farmers.

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