Research Articles

The Effect of Agreed Export Tonnage Scheme (AETS) Policy on Indonesia's Natural Rubber Exports to Japan

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ARTICLE INFO	ABSTRACT
	Natural rubber is one of Indonesia's major agricultural export commodities. However, the export performance of Indonesia's natural rubber to several destination countries experienced a downward trend during the 2011-2019 period. Japan is one of the leading export destinations for Indonesia's natural rubber, experiencing a downward trend in export value. This study aims to analyze Indonesia's natural rubber exports to Japan and its agreed export tonnage scheme (AETS) policy. The study utilized a monthly time series data from 2011 to 2019. The data were analyzed using descriptive qualitative and error correction model (ECM) methods. The results showed the implementation of AETS policy and world natural rubber price had significant effect on the export value of Indonesia's natural rubber to Japan in the long-run, but it is not applied in the short-run. Indonesia needs to improve the quality and productivity of natural rubber production to increase the performance of Indonesia's natural rubber exports to Japan. Furthermore, Indonesia needs to evaluate the effectiveness of the AETS policy on natural rubber.

INTRODUCTION

Natural rubber is a commodity having high prospects in the international market. Natural rubber is widely used as raw material for various industries, causing the demand for this commodity to be relatively high. During the period of 2011-2019, the world's consumption of natural rubber has increased by 2.79 percent per year (IRCo, 2020).

Indonesia is known as one of the largest natural rubbers producing countries in the world with a total plantation area of 3.65 million hectares in 2019 (FAO, 2021). During the period of 2011-2019, the area of Indonesia's rubber plantations fluctuated with an average growth of 0.69 percent per year (Pusdatin, 2020). In line with the increase in the area of rubber plantations, Indonesia's natural rubber production also increased by 1.49 percent per year. Indonesia's natural rubber production in 2019 reached 3.33 million tons, making Indonesia the second largest natural rubber producer after Thailand with a contribution of 22.73 percent of the world's total natural rubber production (IRCo, 2020).

The development of Indonesia's natural rubber production is in line with the development of the export supply of this commodity which is also increasing. Nevertheless, the growth of Indonesia's natural rubber exports supply is not as big as its production growth, which is 0.07 percent per year. This condition shows that the development of Indonesia's natural rubber exports supply is not only affected by the amount of production but also by other factors like competitiveness and quality of the rubber produced. The competitiveness of Indonesia's natural rubber in several destination countries like Brazil, Germany and the United States is still stronger than the competitiveness of natural rubber from Malaysia, Thailand and Vietnam (Azizah, 2018). Nevertheless, market share of Indonesia's natural rubber is still below Thailand controlling around 39.03 percent of the world's natural rubber market share (Lindung, 2018). It is because the competitiveness of Indonesia's natural rubber in the international market as a whole is still less competitive when compared to the competitiveness of Thailand's natural rubber (Ardanari, 2020).

Indonesia's natural rubber export have reached several destination countries in Asia, America, Europe, Australia and Africa. In 2018, as many as 62 countries became the market share of Indonesia's natural rubber, including Japan. Japan is one of the main importers of Indonesia's natural rubber, and it also the world's largest natural rubber importer (FAO, 2021). In 2019, the value of Japan's natural rubber imports increased by 1.43 percent to US$1.12 billion (ITC, 2021).

The primary problem encountered by Indonesia's natural rubber exports is the development of export value which is not proportional to the development of the number of exports offered. During the period of 2011-2019, the volume of Indonesia's natural rubber exports showed a fairly stagnant growth with an average of 0.07 percent per year. Meanwhile, the value of Indonesia's natural rubber exports experienced a significant decline with an average of -11.18 percent per year (Figure 1). The development of the value of Indonesia's natural rubber exports to Japan which is not in line with the development of its export volume shows that an increase in the volume of natural rubber exports to Japan is always unaccompanied by an increase in the value of exports. The development of the value of Indonesia's natural rubber exports to Japan is considered to be affected by several factors like developments in world rubber prices, developments in the exchange rate, developments in competitiveness and quality of rubber produced, as well as the implementation of government policies related to exports.

Figure 1. Indonesia's natural rubber exports performance in 2011-2019
(Source: Pusdatin, 2020)

Empirical research shows that the price of agricultural commodities at the world level, the exchange rate, and the amount of production have a significant effect on the export value of these commodities. For example, export prices and real exchange rates affect coconut oil exports to main destination countries (Dutrianda, 2019). It is similar to the Indonesia's exports of seaweed commodities (Simanjuntak, 2017) and tobacco (Kurniawati, 2016) which are affected by the world prices of each commodity and the real exchange rate. Simultaneously, the amount of national production is identified to have an effect on ginger exports (Aditama, 2015) and Indonesian shrimp exports to destination countries (Mayogantara, 2017).

On rubber commodities, empirical research shows that rubber exports to destination countries are affected by world natural rubber prices (Ginting, 2013; Sari, 2021), exchange rates (Priyono et al, 2019; Oktora, 2019), production (Silaban et al., 2020; Sari, 2021), competitiveness (Asta, 2020), and previous year's export volume (Silaban et al, 2020). These empirical research show that the factors affecting Indonesia's natural rubber

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exports to export destination countries have mixed results. In addition, previous research also varies in the context of study such as using the destination country as a whole (Priyono et al, 2019; Noviana, 2018) and using specific countries like the United States (Silaban et al, 2020) and China (Fihri, 2018; Oktora, 2003). 2019). Typically, these research use annual time series data (Oktora, 2019; Priyono et al, 2019). The analytical methods employed are also varied, like multiple linear regression analysis (Sari, 2021; Priyono et al, 2019), panel data analysis (Oktora, 2019; Asta, 2020), and error correction model (ECM) (Silaban et al, 2020). In addition to use a specific case in Japan as the most considerable source of natural rubber imports comes from Indonesia, this study additionally employs a variable that has been widely unused in previous research, namely the agreed export tonnage scheme (AETS) policy.

The AETS policy is one of three schemes agreed by countries that are members of the International Tripartite Rubber Council (ITRC), such as Indonesia, Thailand, and Malaysia. This policy is a short-term scheme that aims at limiting the amount of natural rubber exports to increase world natural rubber prices (Anwar, 2017). The AETS policy was implemented for the first time in January 2002 and has been implemented six times until 2019. In 2019, the amount of export reduction is set at 240,000 tons and was valid for six months (March-August 2019). The amount is divided proportionally to the three countries in accordance with the amount of production and export contribution of each country. The implementation of this AETS policy can cause changes in the value of Indonesia's natural rubber exports. The exports value can increase if the price increase caused is considerably greater than the decrease in the number of exports carried out.

This study aims to analyze the performance of Indonesia's natural rubber exports to Japan and examine the effect of the AETS policy on Indonesia's natural rubber exports. In addition to using the AETS variable as a variable of interest, this study also utilizes variables of production, world natural rubber prices, the Rupiah exchange rate against the United States dollar, and the previous month's export volume in the monthly period.

REASEARCH METHOD

The data utilized in this study are monthly time series data from 2011-2019. The data consisted of the value of Indonesia's natural rubber exports (HS 400122) to Japan, Indonesia's natural rubber production, world natural rubber prices, the rupiah exchange rate against the United States dollar, the volume of Indonesia's natural rubber exports to Japan from the previous month, and the implementation of the AETS policy. The sources of data are: the International Trade Center, the World Bank, the International Monetary Fund, and the Ministry of Trade.

The data were analyzed using descriptive qualitative and quantitative methods. Qualitative descriptive method was employed to describe the performance of Indonesia's natural rubber and the development of Indonesia's natural rubber exports to Japan. The quantitative method is carried out employing the error correction model (ECM) method to see the effects of variables of production, world natural rubber prices, exchange rates, export volumes from the previous month, and the implementation of the AETS policy on the value of Indonesia's natural rubber exports to Japan in the period of 2011-2019.

The first stage in the analysis employing the ECM method is to test the stationarity of the data using the unit root test. The data are indicated to be stationary if the ADF statistical value is greater than the McKinnon critical value (Basuki, 2014). If all variables are not stationary, the estimation of the model can be continued on the cointegration test. Cointegration test was conducted to observe the long-term relationship between the variables utilized. A variable is said to have cointegration if the residual is stationary at the level (Basuki, 2014). If the cointegration test results show that the variables utilized are cointegrated, these variables are indicated to have a long-term relationship. Nevertheless, it is likely there will be an imbalance in the short term due to economic shocks (Buhaerah, 2017). The last stage is forming the estimates of the long-term and short-term model using the double-log model. The resulting long-term model equation is as follows:

$$LnNEks_t = \alpha_0 + \alpha_1 LnPROD_t + \alpha_2 LnHKD_t + \alpha_3 LnKURS_t + \alpha_4 LnLAG_t + \alpha_5 D + \varepsilon_t$$

$$LnNEks_t = \alpha_0 + \alpha_1 LnHKD_t + \alpha_2 LnLAG_t + \alpha_3 LnNT_t + \alpha_4 D + \varepsilon_t$$

where,
$NEKS_t$: the value of Indonesia's natural rubber exports to Japan for the t-th period (US$)
$PROD_t$: Indonesia's natural rubber production t-th period (tons)
HKD_t : world natural rubber price in t-th period (US$/kg)
$KURS_t$: the exchange rate of the rupiah against the US dollar for the t-th period (Rp/US$)
LAG_t : Indonesia's natural rubber exports volume to Japan in the previous month t-th period (kg)
D : *dummy* of AETS (1 = when the AETS policy is implemented, 0 = when the AETS policy is not implemented)

α_t : *error* t-th period
t   : time period

Meanwhile, the equations of the short-term model are as follows:

$$\triangle NEkspor_t = \alpha_0 + \alpha_1 \triangle LnPROD_t + \alpha_2 \triangle LnHKD_t + \alpha_3 \triangle LnKURS_t + \alpha_4 \triangle LnLAG_t + \alpha_5 D + ECT_{t-1} + \varepsilon_t$$

The error correction term (ECT) shows how quickly the model achieves a state of equilibrium after facing a sudden imbalance (Janes, 2012). The ECM model can be assumed to be valid if the variables utilized are cointegrated with each other and the resulting coefficient value of ECT is negative and statistically significant.

The resulting long-term and short-term model estimates are then tested using the classical assumption test to determine whether or not there are classical assumptions problems that can cause the estimation model to be invalid. There are four tests carried out: normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test.

RESULT AND DISCUSSION

Performance of Indonesia's Natural Rubber Exports to Japan

The performance of Indonesia's natural rubber exports to Japan was fluctuated during the period of 2011-2019. Figure. 2 shows that the volume of Indonesia's natural rubber exports to Japan was fluctuated by an average of 3.34 percent per year. Volume of Indonesia's natural rubber exports was increased from 38.26 thousand tons to 49.36 thousand tons in 2019. In contrast to the development of export volume experiencing an increasing trend, the development of the value of Indonesia's natural rubber exports to Japan experienced a declining trend with an average of 8.68 percent per year. The value of Indonesia's natural rubber exports to Japan in January 2011 reached US$ 135.4 million and decreased to US$ 55.91 million in December 2019 (Figure 2). The decline in the value of Indonesia's natural rubber exports to Japan was related to the development of world natural rubber prices which also experienced a downward trend during this period. The world natural rubber price in 2011 reached US$ 4.52 per kilogram and decreased by 68.78 percent to US$ 1.41 per kilogram in 2019. The development of natural rubber prices, which often experience a decline, needs to be a concern for exporters in exporting these commodities to destination countries. In addition, it is necessary to improve the quality and competitiveness of Indonesia's natural rubber to minimize the risk of price fluctuations in the international market.
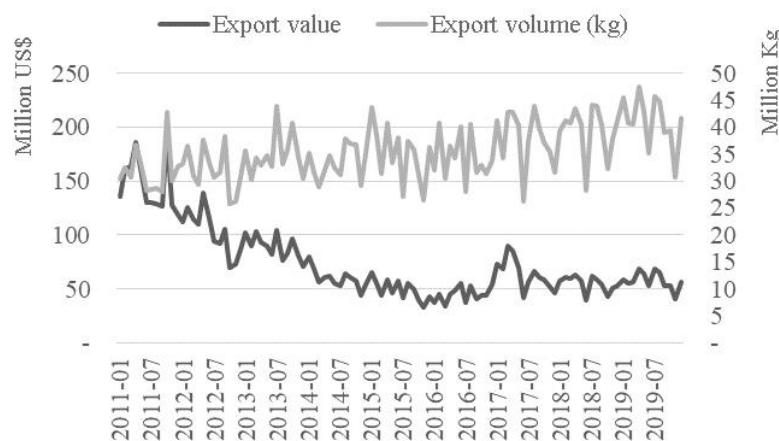
Figure 2. The development of the value of Indonesia's natural rubber exports to Japan in 2011-2019
(Source: Pusdatin, 2020)

In the implementation of natural rubber export activities to Japan, Indonesia encounters various obstacles such as the low productivity of Indonesia's rubber land, the lack of development of the downstream rubber industry in increasing the competitiveness of Indonesia's natural rubber, the implementation of AETS policies by ITRC countries, including Indonesia, and the existence of a non-tariff policy implemented by Japan. The low productivity of Indonesia's rubber land is due to the use of non-optimal superior clones as well as cultivation and postharvest management that do not comply with the recommended standards. In addition, the considerable number of rubber plants that have exceeded their productive age has also contributed to the low

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productivity and quality of Indonesia's natural rubber produced. Indonesia's underdeveloped downstream rubber industry is also one of the obstacles in exporting natural rubber to destination countries. The development of Indonesia's downstream rubber industry is still constrained by the provision of infrastructure that does not meet the requirements and limitations of technology and resources in downstream natural rubber products. The downstream industry performs a substantial role in improving the quality and added value of the rubber products produced. Therefore, the Indonesian government needs to improve and enhance the performance of the downstream rubber industry to increase the competitiveness of Indonesia's natural rubber in the international market.

Another obstacle encountered by Indonesia in exporting natural rubber to destination countries is the implementation of export restriction policies through the AETS scheme carried out by ITRC countries, including Indonesia. In practice, institutions at the national level are required to implement AETS policy by allocating export quotas to natural rubber producers and exporters in each member country (Malaysian Rubber Board, 2012). Indonesia has implemented the AETS policy as many as four times during the period of 2011-2019. From October 2012 to March 2013, Indonesia implemented the third AETS policy with a total reduction of 300,000 tons of natural rubber exports. Furthermore, in March-August 2016, AETS policy was re-implemented with a total export reduction of 615,000 tons. During that period, Indonesia received a reduction of up to 238,736 tons. In January-March 2018, the fifth AETS policy implementation was carried out with a total export reduction of 315,000. Moreover, in March-August 2019, the sixth AETS policy implementation was carried out where Indonesia received an export reduction of up to 98,160 tons. The implementation of the AETS policy can affect the amount of natural rubber commodities offered to international markets, including to Japan. A decrease in export supply which is not accompanied by an increase in prices in the international market will have an impact on the decline in the value of Indonesia's natural rubber exports. Therefore, Indonesia, along with Thailand and Malaysia, need to implement an AETS policy effectively and efficiently so that the reduction in the number of natural rubber exports carried out is proportional to the increase in the price of natural rubber produced in the international market. Thus, the implementation of this policy will not interfere with the performance of Indonesia's natural rubber exports to destination countries, including Japan.

In addition to domestic constraints, Indonesia's natural rubber exports also face obstacles from export destination countries, which is Japan. One of the obstacles encountered was the implementation of non-tariff policies by Japan on several commodities entering the country, including natural rubber. The non-tariff policies mostly applied to commodities in the plantation sector are the sanitary and phytosanitary (SPS) policy and the technical barriers on trade (TBT) policy. During the period of 2012-2016, Japan is acknowledged to have implemented 13 non-tariff policies on Indonesia's natural rubber commodities including four SPS policies in the form of a cold/head treatment and fumigation as well as nine TBT policies in the form of authorization requirement for TBT reason, certification requirement, inspection requirement, traceability information requirement, and TBT measures, n.e.s.m (Virginia, 2018). The implementation of this policy can hamper the performance of Indonesia's natural rubber exports to Japan because the rubber products exported by Indonesia are generally in the form of raw products or semi-finished products which are prone to be affected by the policy (Virginia, 2018). To overcome this problem, it is necessary to conduct training and education for natural rubber producers and exporters so that they can produce products that meet the standards and quality determined by Japan.

Factors Affecting Indonesia's Natural Rubber Exports to Japan

In this study, there are four tests carried out to estimate the model affecting Indonesia's natural rubber exports to Japan as follows:

Stationarity Test

The results of the stationarity test at the level stage show that the variables of export value, production, world rubber prices, and the exchange rate of the rupiah against the US dollar are not stationary, while the variables of export lag and dummy of AETS are stationary. Therefore, it is necessary to carry out a unit root test at the first difference stage as a consequence of the non-fulfillment of the stationarity assumption at the level stage. The results of the stationarity test at the first difference stage show that all the variables utilized are stationary (Table 1).

Table 1. The results of the stationarity test of the data at the stage *1ˢᵗ difference*

Variable	Score of ADF	Critical Score of McKinnon (5%)	Information:
Export value	-9,635	-2,889	Stationary
Production	-7,185	-2,891	Stationary
World rubber price	-8,001	-2,889	Stationary
Exchange rate	-7,861	-2,889	Stationary
Export lag	-12,251	-2,889	Stationary
AETS	-10,198	-2,889	Stationary

Cointegration Test

Cointegration test results show that the residuals of the regression model are stationary at the level stage. It can be seen from the resulting statistic score of ADF (-7.605) which is smaller than the critical score of McKinnon at the 5 percent level of significance (-2.931). Thus, it can be concluded that the data used in the regression model is cointegrated.

Classical assumption test

Classical assumption tests have been carried out on long-term and short-term regression models. The results of the normality test show that the Jarque-Berra probability score in the long-term model (0.548) and in the short-term model (0.452) is greater than 0.05 of level of significance. It shows that the data used in both regression models are normally distributed and meet the classical assumption of normality. In the multicollinearity test, the results show that the VIF value for all independent variables in the long-term and short-term models is less than 10 so that the two regression models used do not have multicollinearity problems. The results of the autocorrelation test show that the probability score of obs*R-squared in the long-term model (0.074) and short-term model (0.089) is greater than the 0.05 of level of significance, thus it can be concluded that the two regression models used do not contain autocorrelation problems. Meanwhile, the results of the heteroscedasticity test show that the probability score of obs*R-squared in the long-term model (0.848) and the short-term model (0.936) is greater than the 0.05 of level of significance so that the two regression models used do not contain heteroscedasticity problems. Based on this, it can be concluded that both the long-term and short-term regression models used have met the requirements of the classical assumptions.

Error Correction Model (ECM) Test in the Long Term

In the long-term regression model, the resulting R-Squared score is 0.8459, meaning that 84.59 percent of the variation in the value of Indonesia's natural rubber exports to Japan can be explained by production variables, world rubber prices, export lag, exchange rates, and the dummy of AETS. Meanwhile, the remaining 15.42 percent is explained by other variables outside the model. The resulting F-statistical probability score is smaller than the 0.05 of level of significance, meaning that the variables of production, world rubber prices, export lag, exchange rates, and the dummy of AETS simultaneously have a significant effect on the value of Indonesia's natural rubber exports to Japan (Table 2).

Table 2. Estimation of long-term regression model

Variable	Coefficient	Probability
Constanta	18,513	0,000
Production	0,005	0,969
World rubber price	0,822	0,000***
Exchange rate	-0,154	0,499
Export lag	0,021	0,849
AETS	-0,087	0,016**
R-squared	0.8549	
Prob. (F-statistic)	0.0000	

Note: **, *** each significant at 5% and 1% of level of significance

In the long term, Indonesia's natural rubber exports to Japan are affected by world rubber prices and AETS policy (Table 2). First, the implementation of the AETS policy has a negative and significant effect on the value of Indonesia's natural rubber exports to Japan at a significant level of 0.05 with a coefficient of -0.087 (Table 2). The coefficient score shows the elasticity of the variable, meaning the implementation of the AETS policy will

cause a decrease in the value of Indonesia's natural rubber exports to Japan by 0.087 percent, ceteris paribus. The negative relationship between the implementation of AETS and the value of Indonesia's natural rubber exports can occur because the implementation of the policy is unable to increase the price of natural rubber in the international market. Indonesia has implemented export restriction policies 4 times during the period 2011-2019 but the development of Indonesia's natural rubber prices did not indicate positive growth where the average growth reached -0.79 percent per month. Mahyuddin (2020) explained the implementation of AETS in 2016 could not increase the world natural rubber prices due to several factors such as the failure to control excess supply, the trade war between the United States and China, and the presence of natural rubber exporter countries that did not join the ITRC. In addition, the world natural rubber price only increased when the AETS was implemented, and it then decreased after the policy was completed. In 2016, Indonesia received a reduction in exports of 238,740 tons and caused the price of natural rubber to increase in April 2016. However, this increase could not last long because the price of natural rubber was back to decrease by 33 percent in 2017 (Databoks, 2018). A decline in prices on the international market that is unaccompanied by a significant increase in the number of exports will have an impact on the decline in the value of Indonesia's natural rubber exports to Japan in the long term.

Second, the world natural rubber price has a significant effect on the value of Indonesia's natural rubber exports to Japan at a significant level of 0.05 with a coefficient of 0.822 (Table 2). The coefficient shows a variable elasticity, meaning that when the world natural rubber price increases by US$1/kg, the value of Indonesia's natural rubber exports to Japan will increase by US$0.822, ceteris paribus. It is in accordance with the proposed hypothesis and the supply theory stating the price of a commodity has a positive relationship to the export of that commodity. When the price of a commodity increases, the supply of that commodity will increase, ceteris paribus (Sukirno, 2003). During the period of 2011–2019, the growth of world natural rubber prices fluctuated, followed by fluctuations in the value of Indonesia's natural rubber exports to Japan. In January 2011, the world natural rubber price reached US$ 5.33 per kilogram, and it decreased to US$ 1.67 per kilogram in December 2019. A similar condition occurred in the value of Indonesia's natural rubber exports to Japan, decreasing from US$ 135 million to US$ 55.91 million. The decrease in the price of natural rubber on the international market caused the number of commodities offered to decrease, causing the export value of these commodities to experience a decline as well.

On the other hand, Indonesia's natural rubber production, the exchange rate of the Rupiah against the US dollar and the volume of Indonesia's natural rubber exports to Japan from the previous month were not significant to the value of Indonesia's natural rubber exports to Japan (Table 2). The results of this study are inconsistent from research conducted by Ginting (2013) stating the exchange rate of the Rupiah against the United States dollar has a significant effect on Indonesia's exports in the long term. With regard to export lag, the results of this study are in line with Maulana's research (2011) stating that the volume of exports of coffee from Central Java in the previous year had no significant effect on exports of coffee from Central Java for the period of 1990-2009.

Error Correction Model (ECM) Test in the Short Term

ECM test was conducted to identify the effect of the independent variable on the dependent variable in the short term. Estimation results of ECM show that the variable of ECT statistically has a significant effect with a probability of 0.000 (Table 3). The resulting coefficient of ECT indicates the speed of adjustment of the value of Indonesia's natural rubber exports to Japan towards a long-term balance with a score of 0.833, meaning the mismatch between the actual export value and the desired export value will be corrected by an average of 83.3 percent every month to achieve balance value.

Table 3. Estimation of short-term regression model

Variable	Coefficient	Probability
Constanta	-0,015	0,370
D(Production)	-0,116	0,404
D(World rubber price)	-0,023	0,904
D(Exchange rate)	0,766	0,371
D(Export lag)	-0,060	0,536
AETS	0,019	0,572
ECT(-1)	-0,833	0,000***
R-squared	0.4838	
Prob. (F-statistic)	0.0000	

Note: *** significant at the significance level of 1%

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However, in the short-term AETS policy has no significant effect on the value of Indonesia's exports to Japan (Table 3). The implementation of the AETS policy does not affect the value of Indonesia's natural rubber exports to Japan. It is allegedly because the implementation of the policy has not been effective in increasing natural rubber prices in the short term. The average growth of natural rubber prices during the AETS policy was only 1.16 percent per month. In addition, the price of natural rubber does not consistently increase when the AETS is enforced. In the sixth implementation of AETS in March-August 2019, natural rubber prices are acknowledged to have decreased by an average of -2.15 percent per month. Mahyuddin (2020) in his research stated that policy to suppress production and exports carried out by ITRC countries caused a new problem. The problem is the emergence of natural rubber producing countries outside the ITRC like Laos, Cambodia, and Myanmar which increasingly increased the number of exports of these commodities. It has caused an increase in supply in the international market which has caused the world natural rubber price to decline. In addition, the presence of Vietnam, which is also the world's largest natural rubber producer, is a problem encountered by the ITRC. The reason is Vietnam was still reluctant to join the ITRC until 2019, causing the ITRC to have difficulty controlling the supply of natural rubber in the international market through the AETS policy. Mahyuddin (2020) stated that if Vietnam could join the ITRC, the ITRC would be able to control 90% of the world's natural rubber production, which would have an impact on the development of world natural rubber prices. Meanwhile, Kopp (2019) explained the insignificant effect of the AETS policy was related to the non-compliance of ITRC member countries in implementing existing policies and the lack of coordination in implementing existing agreements. The Committee of Monitoring and controlling AETS policy stated that the implementation of AETS policy often did not run properly due to violations committed by ITRC member countries, one of which was Thailand. Verico (2013) also argued that the countries that are members of the ITRC tend to compete with each other and exploit each other's oligopolistic power rather than working together to maintain the balance of natural rubber prices in the international market.

Other factors like production, world natural rubber prices, exchange rates and the export lag from the previous month also had no significant effect on Indonesia's exports to Japan. The world natural rubber price has no effect. It is presumably because of the cooperation contract between rubber exporting and importing countries regarding the quantity of exports demanded to avoid the risk of price fluctuations and exchange rates in the short term. Indonesia's natural rubber production has no effect. It is presumably because not all Indonesia's natural rubber can meet the quality standards set by Japan so that these commodities cannot be fully exported to Japan. In addition, the high production of natural rubber is not only intended to export to Japan but also to export to other countries with a higher market share such as the United States and to meet domestic consumption needs.

CONCLUSION

The volume of Indonesia's natural rubber exports to Japan experienced an upward trend, while the export value experienced a downward trend during the period of 2011-2019. The analysis results employing the ECM method show that the AETS policy and world natural rubber prices only affect Indonesia's exports to Japan in the long term, but it is unapplied for the short term. On the other hand, Indonesia's natural rubber exports to Japan were unaffected by Indonesia's natural rubber production, world natural rubber prices, real exchange rates and the volume of natural rubber exports from the previous month, both in the long and short term.

To be able to continue to maintain the supply of Indonesia's natural rubber for both export and domestic industrial development, it is necessary to improve the quality and productivity of Indonesia's natural rubber, like rejuvenating rubber plants and improving plantation management. In addition, it is necessary to review the effectiveness of the AETS policy, including in the increase of the commitment and responsibility of each country in implementing the AETS policy.

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