

Can Trade Integration Lead to Economic Development Convergence?

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Abstract—The main focus of this research is to analyse the integration of Indonesia's rubber trade with countries in the ASEAN region and how this trade integration affects the convergence of development. The analysis method used is the principal analysis method that measures the integration of Indonesia's rubber trade with the ASEAN region, and the fixed effect method approach to examine the impact of trade integration on regional economic development convergence. The results showed that the greater integration of Indonesia's rubber trade with ASEAN countries was marked by the principal value of its component analysis, which grew from 1989 to 2017. Increased integration of this rubber trade with the ASEAN region is also very dependent on regional and global economic conditions, when regional and global economies experience a decline, the intensity of Indonesia's rubber trade also fluctuates towards decreasing. Changes in economic progress shown by changes in the value of GDP greatly affect the strength of integration of Indonesia's rubber trade with the country concerned, changes in the value of GDP of rubber export destination countries have led to the convergence of Indonesia's economy with Singapore, Thailand and Vietnam, and experienced divergence with Malaysia and the Philippines.

Keywords: *trade integration, principal component analysis, convergence economy*

I. INTRODUCTION

Economic integration in one region is always preceded by integrating trade between countries, especially in some of its mainstay commodities, through the preparation of regional trade agreements [1-4]. Trade integration is one form of economic integration in one region and globally. This economic integration has become one of the global economic policies [5-7]. The impact of a country's economic integration with one region can be seen in the field of development and economic growth. The most visible benefits if the occurrence of economic integration in a country are the efficiency of production costs, low investment risk, market expansion, resource accumulation, economic of scale, the efficiency of economic resource allocation [5,8].

Analysis of economic integration is closely related to trade theory about cost reduction in trade activities that leads to market integration. Actually the degree of economic integration in one region consists of several forms: Economic Union,

Custom union, Free trade area, Partial integration, preferential trading, and Long term trade agreement [9].

Economic union is an absolute integration because there is complete or complete integration between countries in one region. Economic integration is seen in all aspects of the economy, social culture and social politics. All countries in the region agreed to fully integrate into all aspects of development by drawing up a joint agreement (agreement) to carry out free trade (free trade area) [1,6-8,10,11] on limited or certain regions. For this case, the ASEAN organization has declared its territory as a free trade area in the ASEAN free trade area (AFTA) declaration. This agreement which was then more popular with regional economic integration was a new idea about the expansion of a country's foreign trade within its region, through a regional trade agreement.

However, Economic integration in the form of a custom union is more focused on setting trade tariffs in general for internal regions and special rules for external regions. In agreements between countries custom unions are imposed usually free trade without restrictions (unrestricted).

The free trade area involves the cancellation of all trade barriers and tariffs in a regional economic organization in a region, but each free member country also maintains trade relations with other countries. Countries that are members of the free trade area do not impose tariffs for any country in the trading system, as imposed by the European Economic Community (EEC) and a combination of Latin American free trade area (LAFTA).

Sectoral partial integration refers to efforts to build a common market in certain trade products such as rubber, coal and palm oil. But unfortunately for the AFTA region, the merging of tariffs together for Indonesia's main commodities has not been included in the agreement to impose free entry tariffs in the ASEAN region. Therefore, this study wants to analyse how big is the potential for the integration of rubber commodity trade, by linking it to the development convergence among ASEAN countries involved in rubber trade with Indonesia.

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II. METHOD

The unit analysis in this study is the value of Indonesia's rubber exports from 2008 to 2017. Data is collected from data based on world banks through the website <https://wits.worldbank.org>. Analysis of the integration of the Indonesian economy with its rubber trading partner countries in the ASEAN region, then there are two approaches used namely the principal component analysis (PCA) approach [12], and multiple correspondence analysis (MCA). The PCA approach is more suitable for analysing economic integration using variable categories, whereas if using continuous variables it is more suitable to use MCA [4]. Therefore this research specializes in the MCA approach.

According to the theory of trade gravity proposed by Tinbergen, international trade in two countries, between state i and state j. for year t, symbolized by X_{ijt} , which depends positively on the size of the economies of the two countries Y_i and Y_j in succession and is negatively related to the cost of C_{ijt} trade, thus taking the form of the equation as follows:

$$X_{ij} = \frac{Y_i Y_j}{Y^w} \left(\frac{t_{ijt}}{P_i P_j} \right)^{1-\delta} \quad (1)$$

where:

X_{ij} = The export volume of rubber trade between countries i, to country j.

$\frac{Y_i Y_j}{Y^w}$ = The value of GDP of country i, and country j relative to the total GDP of ASEAN countries

$\frac{t_{ijt}}{P_i P_j}$ = The ratio between cost trade and rubber commodity prices, at time t.

Measurement of trade integration with parametric methods uses principal component analysis (PCA), the first step is to determine the variables to be analysed, raw data then sorted from maximum to minimum, then the index value is calculated using the PCA method by taking the formula [13,14], as follows:

$$Indek\ PCA = X_{ij} = \frac{X_{ij} - X_{ij\ Minimum}}{MaxX_{ij} - MinX_{ij}} \quad (2)$$

Where:

X_{ij} = The value of rubber export variables to be measured integration

$X_{ij\ Minimum}$ = Minimum variable value after sorting (descending)

$Max\ X_{ij}$ = The maximum value of the rubber export variable value after being sorted

$Min\ X_{ij}$ = Minimum value of rubber export value after being sorted.

Furthermore, changes in the export orientation of a country in an export regional region can then be analysed using the intra-regional export approach as stated by Fujita, as in the following formula [15]:

$$X_{it}^R = \frac{X_{it}^R}{X_{it}^W} \frac{X_{it}^W}{GDP_{it}} GDP_{it} \quad (3)$$

where:

X_{it}^R = country i rubber exports, at time t,

X_{it}^W = Total rubber exports of ASEAN countries at current prices

GDP_{it} = GDP countries i, at time t

The portion of rubber exports in country i, the data is taken from the volume value of rubber exports from country i, in 2008 to 2017. The GDP value of each ASEAN country is based on the prevailing prices obtained from the world integrated trade solution from the data based World Bank, (<https://wits.worldbank.org>).

Furthermore, changes in the openness of a country's exports are strongly influenced by changes in export orientation as export partners in certain commodities. The change in openness is a measure of the ratio between the volumes of rubber exports to the country's GDP value. Finally, the change in the value of rubber exports is of course also strongly influenced by the size of the economic progress of Indonesia's rubber trading partner countries which will be seen from the value of GDP at current prices from time to time. The complete model [11], can be stated as follows:

$$dLog[X_i^R] = dLog\left[\frac{X_i^R}{X_i^W}\right] + dLog\left[\frac{X_i^W}{GDP_i}\right] + dLog(GDP_i) \quad (4)$$

Changes in Indonesia's rubber exports will be influenced by changes in the export orientation shown by the ratio between the volumes of Indonesian rubber exports to the volume of rubber exports in the ASEAN region. It is assumed that the greater the ratio of the export value to the value and formation of its GDP, the rubber export activity will become increasingly high, so that the intensity of rubber trade with this country will be higher.

III. RESULTS AND DISCUSSION

The integration of Indonesia's rubber trade with ASEAN countries has increased from time to time, data from the analysis of rubber exports to ASEAN countries have been analysed using the principal component analysis (PCA) method, which considers the maximum and minimum value of Indonesia's rubber exports since approximately thirty years 1989-2017, see Figure 1. It reached its peak of increase until 2011, but along with the weakening of the world economy which was marked by the United States government activities shutdown (the economist 2013), and weakened the economies of several Indonesian export destination countries such as to Europe and North America.



Fig. 1. PCA index of Indonesia's rubber exports to the ASEAN region.

The ASEAN countries with the most intense rubber trade with Indonesia are Malaysia, Singapore, Thailand, Vietnam and the Philippines, but among the five ASEAN countries which are Indonesia's rubber trade partners, the most stable are with Malaysia, and Thailand, Vietnam and the Philippines. Meanwhile, with Singapore, the index has experienced instability, from 2005 to 2014 the index has a negative value, this is due to the lack of well-developed rubber trading policy space, as discovered by Sena Kim Ngnangnon [3,16], see Figure 2.



Fig. 2. PCA index development of Indonesian rubber exports to Singapore.

The fluctuation of the integration of the Indonesian rubber trade with the country of Singapore shows that the intensity of the rubber trade is strongly influenced by the performance of the country's economy in Singapore, especially as seen from the development of its GDP at current prices. The ratio of Indonesia's rubber export value to Singapore continued to decline from 1989 to 2017, the lowest decline in trade integration occurred at the time of the monetary crisis in 1997, despite experiencing recovery from 2001 to 2009, but the monetary crisis that hit the world again made the value and the volume of Indonesia's rubber exports to Singapore has decreased in intensity.



Fig. 3. PCA index of Indonesia's rubber exports to Malaysia.

The decline in the intensity of Indonesia's rubber trade with Singapore is more due to the economic growth of the country of Singapore itself, which can be seen that the ratio between the values of Indonesia's rubber trade with the formation of the value of the Singapore state's GDP has declined drastically. This implies that the intensity of rubber trade with Indonesia has decreased. However, when viewed from the value of the rubber trade between Indonesia and Singapore and Malaysia as

in Figure 3 above shows that the rubber trade with Malaysia tends to be more stable and strongly integrated, but the trade value is relatively lower than the value of trade with Singapore. The ratio of the value of rubber trade with Singapore's GDP is much higher, when compared to the ratio of the value of Indonesia's rubber trade to Malaysian GDP. This means that the value of Indonesia's rubber trade with Singapore is far higher than that of Malaysia.

The results of the regression analysis using panel data, where the dependent variable is the change in Indonesian rubber exports to Singapore which is affected by the GDP of the export destination country, changes in export orientation, and changes in trade openness with these ASEAN countries, it turns out if changes in trade intensity with Singapore because of changes in GDP, changes in trade orientation and changes in openness in trade, the biggest positive impact is felt by Malaysia and Philippines, both countries have a negative response to changes in orientation and openness of Indonesia's rubber trade with Singapore, at the time of intensity Indonesia's rubber trade with Singapore, then Malaysia and Philippines responded positively. This means that when the intensity of trade with Singapore decreases due to Singapore's economic performance, the intensity of Indonesia's rubber trade begins to increase with Malaysia and Vietnam. Whereas Thailand and Vietnam have positive responses. This means that the intensity of Indonesia's rubber trade with Malaysia and the Philippines is largely determined by the change in integration of the rubber trade with Singapore.

The State of Singapore is the centre of integration of Indonesia's rubber trade with ASEAN countries is reasonable, because in 3.4 above, it appears that the ratio of Singapore's rubber trade value far exceeds the ratio of the value of rubber trade with Malaysian GDP. That is why, Singapore is a price taker in Indonesia's rubber trade in ASEAN, this is in line with the findings of Ansofino's research which states that the country that captures the greatest value added in Indonesia's rubber trade is Singapore [17-19].

There are three types of panel data tested by pooled least square (PLS), fixed effect method (FEM) and random effect method (REM) testing methods. The assumption used for the fixed effect method is the diversity of trade integration with the ASEAN countries which is not observed to correlate with a number of characteristics that are not observed. While the assumption for the RE method is the diversity of characteristics that are not observed is not correlated with the characteristics observed. Determination of whether the panel data testing model for innovation in the West Sumatra tourism destination region is in Pooled, FE or RE, then the Chow-likelihood ration test and Hausman Test are used [14,17,20].



Fig. 4. Comparison of Indonesia's rubber trade value ratio with the GDP of Malaysia and Singapore.

The test results for the first fixed effect (FEM) model on the changes in the integration of the Indonesian rubber trade with Singapore, using the Likelihood ratio (LR) method, the calculated value of $X^2 = 21.06$ is far greater than the X^2 table, making it significant that this model is more appropriate analysed by the fixed effect method. In model two, the LR value, $X^2 = 14.26$ is very significant at all test levels of 1%, 5% and 10%, so the fixed effect model is the most appropriate model in estimating changes in the integration of Indonesia's rubber trade with the ASEAN region. See Table 1.

TABLE I. ESTIMATION RESULTS OF THE FIXED EFFECT METHOD OF CHANGING INTEGRATION OF INDONESIAN RUBBER TRADE WITH ASEAN COUNTRIES IN 1989-2017

Independent Variable	Dependent variable: Change in Integration of Indonesia's Rubber Trade with Singapore		Dependent Variable: Change in Integration of Indonesia's Rubber Trade with ASEAN	
	Model 1		Model 2	
	PLS	FEM	PLS	FEM
Constanta	56504,34	24932,24	1151577	872588,6
GDP Current (US \$) (X1)	-8,75** (2,97)	-1,25** (3,65)	1,58 (0,84)	4,21**
Change in export orientation (X2)	-22408,13 (0,17)	136726,4 (0,739)	- 885562,7** (-1,07)	- 605096,8**
Changes in trade openness (X3)	4358,14 (1,11)	50397,06** (3,82)	2048,33** (0,81)	314752,3**
R ²	0,1634	0,4296	0,052138	0,2687
Adjusted R	0,1142	0,3446	0,003618	0,1597
F Statistic	3,32	5,05	0,9351	2,46

Source: Result Analysis, 2019

The results of the Fixed Effect Analysis of Changes in Trade Integration with ASEAN Countries show that changes in total trade integration due to changes in GDP, export orientation and openness of rubber trade between Indonesia and the ASEAN region show that there is convergence in Singapore, Thailand and Vietnam with Indonesia, in contrast to Malaysia and Philippines actually experienced a divergence. This means that the greater the change in GDP in Singapore, Thailand and Vietnam, the greater the tendency for convergence of the rubber trade integration with the ASEAN region, the opposite will happen with Malaysia and the Philippines. This means that the greater the ratio of the value of Indonesia's rubber trade with the GDP of ASEAN countries, the stronger the drive for integration of the rubber trade.

In the case of trade integration with Malaysia and the Philippines, the ratio of the value of Indonesia's rubber trade with its increasingly smaller GDP has resulted in increasingly divergences in the integration of Indonesia's rubber trade with that country. Empirical facts show that if the integration of Indonesia's rubber trade with these three countries namely Singapore, Thailand and Vietnam has decreased in intensity, the intensity of trade with Malaysia and the Philippines will increase, see figure 5. That is why at the time of the convergence of trade with Singapore, Thailand and Vietnam is high, then with Malaysia and the Philippines actually is happening divergence.

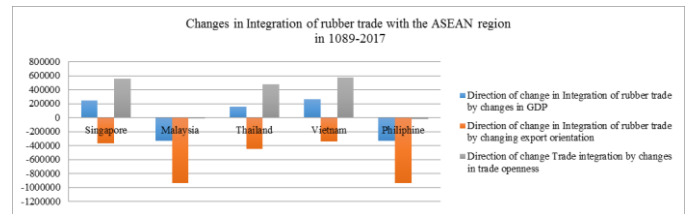


Fig. 5. The direction of the convergence of Indonesian rubber trade integration with ASEAN region.

Convergence occurs when a change in orientation of Indonesia's rubber exports to ASEAN countries, where the decreasing ratio of the value of Indonesia's rubber trade with the value of exports of ASEAN countries, the less there is convergence of rubber trade in the ASEAN region.

The direction of trade openness changes marked by the increasingly large ratio between the values of Indonesia's rubber exports to the GDP of ASEAN countries, the integration of Indonesia's rubber trade will be stronger with ASEAN countries, especially with Singapore, Thailand and Vietnam. Especially with regard to changes in the GDP of ASEAN countries, this will encourage the collar of stronger integration of rubber trade with the ASEAN region and in turn also encourage stronger convergence.

The change in the export orientation of the ASEAN countries has led to the increasingly reduced integration of Indonesia's rubber trade with the ASEAN region. Changes in trade openness have led to the integration of Indonesia's rubber trade with Singapore, Thailand and Vietnam in the direction of economic convergence, on the contrary reducing convergence with Malaysia and the Philippines. It means, at the time when the integration of rubber trade with Singapore, Thailand and Vietnam was weak, the strengthening of trade integration was taken over by Malaysia and the Philippines.

IV. CONCLUSION

Based on the subject matter examined and carried out a discussion using the integration approach of Indonesia's rubber trade with the ASEAN region, it can be concluded several conclusions in accordance with the research objectives stated earlier.

The greater integration of Indonesia's rubber trade with ASEAN countries is marked by the greater value of its principal component analysis (PCA) from 1989 to 2017. The increased integration of this rubber trade with the region is also very dependent on regional and global economic conditions, at a time when the regional economy and global slowdown, the intensity of Indonesia's rubber trade has also fluctuated towards decreasing.

Changes in economic progress as demonstrated by changes in the value of GDP greatly affect the strength of integration of Indonesia's rubber trade with the country concerned, changes in the value of GDP of rubber export destination countries have led to the convergence of Indonesia's economy with Singapore, Thailand and Vietnam, and experienced divergence with Malaysia and the Philippines.

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