

Regional Economic Improvement Model through Integration of West Sumateran Rubber Market with ASEAN Regional Market

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Abstract—This paper examines the interrelationship between the success of regional economic development with its external regions by requiring to create market integration of the main commodities production. The occurrence of market integration is one of the necessities for the creation of economic agglomerations in the development area. The research approach method used is a regional economic analysis approach. Trade integration is measured using the Grubel Lloyd Index. Research results show that the rubber economy market in West Sumatra has been cointegrated with the economic corridors of Sumatra and ASEAN countries. The market integration of the rubber economy has been captured with the Grubel-Lloyd index which successfully explains the interrelationships between rubber exports and imports with ASEAN countries all this time.

Keywords— *market integration; rubber market; intra industry trade of rubber*

I. INTRODUCTION

Agro-industry plays an important role in the early stages of economic and rural development [1-3]. Agro-industry improves the quality of agricultural products and increases farmer's household income [4]. In order to activate the agro-industry sub-sector needs the availability of investment resources, skilled labor, availability of new technologies for product development to high added value, availability of capital and labor to overcome the obstacles of economies of scale [4,5].

Agroindustry is the ability to create a products portfolio from raw agricultural products converted into high-value final or semi-final products. The products portfolio are derivatives of raw agricultural products that are converted into valuable products. The steps of the product conversion Jonkman, et al 2015 as follow: 1). developing the portfolio of agricultural products based on composition and functionality from agricultural raw products, 2). develop a synthesis process to create a superstructure of new agricultural products portfolio and 4). Use of a multi-purpose optimization method to develop designs of agricultural products portfolio. To develop products portfolio from agricultural products, need to consider about the structure, functionality, the appropriate aspect of time and space [6].

The driving force of the exchange (market) is economic scale in production and consumption of the end product [7,8]. The development of production networks between regions, intra-industry exchange has expanded between regions at different income levels and different components of the end products that ultimately triggers the creation of economic agglomeration.

Agglomeration relates to geographical concentration and location of economic activities among companies that interact each other to carry out economic and business transactions [9]. There are three factors that influence the concentration of economic activity, namely 1). Technology or externalities that are not related to money, 2). Increasing return to scale, 3). Imperfect / spatial competition. Increasing return to scale is a very important concept to explain the spatial concentration of economic activity. The production costs will decrease as companies and industries concentrate in one location.

Economic agglomeration can also occur by industrial factors and location [10,11]. A company that is located close to each other in the same industry can take advantage of economic localization. The benefits of this inter-industry relationship can be in the form of access to technology transfer, the existence of a buyer-supplier network, and the opportunity for sub-contracting with each other. Agglomeration will occur when transportation costs are increasing that lead to the spatial labor mobility becomes low. Decreasing of the transportation costs will make the industrial companies have an incentive to concentrate their production in certain locations to reduce fixed costs. Transportation costs will be reduced in locations where there is a very good access of market input and output. Market access is a very strong determinant of the creation of agglomeration. Therefore, to create economic agglomeration, the provision of infrastructure quality will enhance the linkages between companies in economic transactions and their business in the center of the market.

According to Mc Cann that the decision of the location of a company depends not only on transportation costs in the form of distance, but also on the value of the shipping goods and the added value of the company. The source of the agglomeration is:

- At the corporate level is from improving access to input and market output.
- At the industry level is economic localization among existing industries will create transactions between them
- At the regional level is economic urbanization among industries, which describes urban density (income, output, etc.).

II. METHOD

This research used the regional economic analysis approach, namely trade integration and a measure of the creation of economic agglomeration, specifically in the rubber market in West Sumatra and its market integration with the regional markets of Sumatra and ASEAN economic corridors.

Trade integration is analyzed using Grubel-Lloyd index (1978). Exchange between industries can occur horizontally or vertically. Measurements that are commonly used to find out the trade between these industries in an area use the Grubel-Kelly index [3,12], with the following formula:

$$GL_{ijkt} = 1 - \frac{(X_{ijkt} - m_{ijkt})}{x_{ijkt} + m_{ijkt}}$$

$$miit_{iit} = 1 - \frac{(\Delta x_{ijk} - \Delta m_{ijk})}{(\Delta x_{ijk}) + (\Delta m_{ijk})}$$

Where:

GL_{ijkt} = Grubel –Lloyd index from region i and j

$MIIT_{ijkt}$ = Marginal intra industry trade index from region i to j on product k and time t.

X_{ijkt} = Export/ sale of industrial product on region i to industry j on time t

M_{ijkt} = Import/ sale of industrial product on region i from region j on time t

Role of the thumb for the formula:

When GL index = 0; exchanges only occur in one direction.

When GL index = 1; balance industry exchanges.

When GL index between 0 and 1 = imbalance industry exchanges.

III. RESULT AND DISCUSSIONS

The planting and rubber production area in West Sumatra is most dominant in 3 central regions, namely the Dharmasraya, Sijunjung and Pasaman Regency, see figure1. The highest growth of planting area and rubber production in the last five years is found in Pasaman regency which reached 67% for production and 62% for rubber planting area. Meanwhile, the number of households that cultivate rubber is most dominant in Sijunjung Regency reached 40% and Dharmasraya is 36%. Pasaman Regency as a center of rubber production and planting area has the lowest number of farmer households.

It shows that the productivity of rubber farmer households in Pasaman Regency is higher than Dharmasraya and Sijunjung. Another implication of this condition was that the average land ownership per household in Pasaman was higher than the average land ownership in Dharmasraya and Sijunjung. The average land area per household of rubber farmers in Pasaman district is 1.37 ha /household which is bigger than Sijunjung as 0.814 ha/ household and in Dharmasraya reaches an average of 0.910 ha / household. The difference in the average ownership of rubber land is also accompanied by the rate of production growth and the growth rate of the planted area.

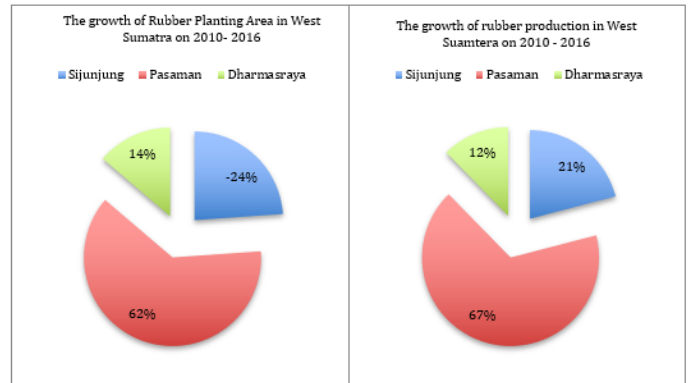


Fig. 1. Comparison of rubber planting and production area in the in West Sumatra.

From the figure 1 above that Pasaman has advantages in terms of planting area and rubber production, compared to Sijunjung and Dharmasraya. This advantage is due to the fact that the average area of land ownership per farmer household in Pasaman reaches more than 1.37 ha / household. However, table 1 show the percentage of households in the rubber commodity exploitation was greater in the Dharmasraya which reached 71.65% followed by Sijunjung with 61.15%. Pasaman has only 51.57% of rubber farmer households. Therefore that the biggest rubber production centers and households are in Dharmasraya and Sijunjung even though their rubber cultivation is still under 1 ha / household.

TABLE I. THE NUMBER OF HOUSEHOLD OF RUBBER FARMER IN WEST SUMATERA ON 2017

Regency	Number of households	Number of rubber farmer household	Percentage of rubber farmer household (%)	Rubber cultivation area (ha)	Average of land ownership (ha/hh)
Dharmasraya	56974	40823	71,65	37176	1,10
Sijunjung	54569	40996	75,12	33370	1,23
Pasaman	64769	33402	51,57	24439	1,37
Sumatera Barat	1264097	186091	14,72	181002	1,03

Research result in 2018 and data analysis from BPS Sumbar 2018.

It shows that the number of households that cultivate rubber as their main livelihood in West Sumatra reaches 14.72% of the total number of households. The most dominant of the three production and planting area is Sijunjung district which reaches 75.12% of households. It followed by Dharmasraya regency at 71.65% and Pasaman with 51.57%.

Figure 2 provides information that there are three regions as centers for planting and rubber production in West Sumatra, namely Pasaman, Sijunjung and Dharmasraya

regencies. The role of other kabupaten shares is relatively small, such as the Lima Puluh Kota, Pesisir Selatan and South Solok districts which are less than 10%.

The three centers in the span of the last five years show its dominance from sixteen other regency in West Sumatra. Dharmasraya Regency in the last five years has always been the biggest producer of rubber commodities, but since 2015 it can be followed by the Pasaman regency which surpassed Sijunjung and Dharmasraya.

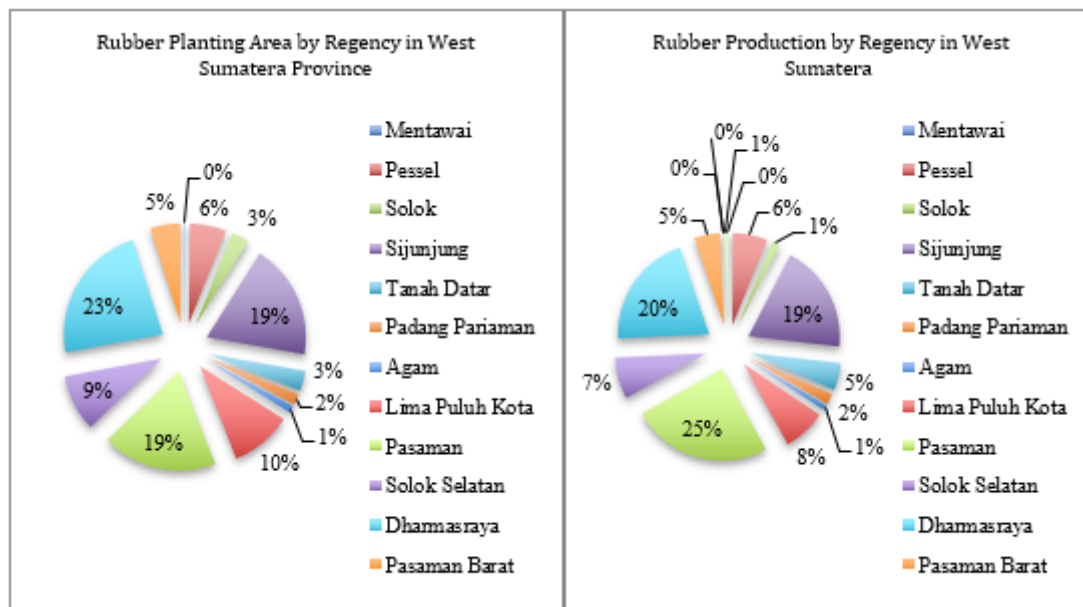


Fig. 2. Rubber planting area and production by regency in West Sumatera Province.

The potential of rubber planting area and production is spread among regencies in West Sumatra. There are at least six regencies that have large planting and production areas over the past five years such as: Pasaman, Dharmasraya, Sijunjung, Pesisir Selatan, Lima Puluh Kota and Solok

Selatan. The remaining are below the average of West Sumatra as 9526 ha for planting area and 8621 tons for production. This number is still far below compared to other rubber production provinces in Sumatra.

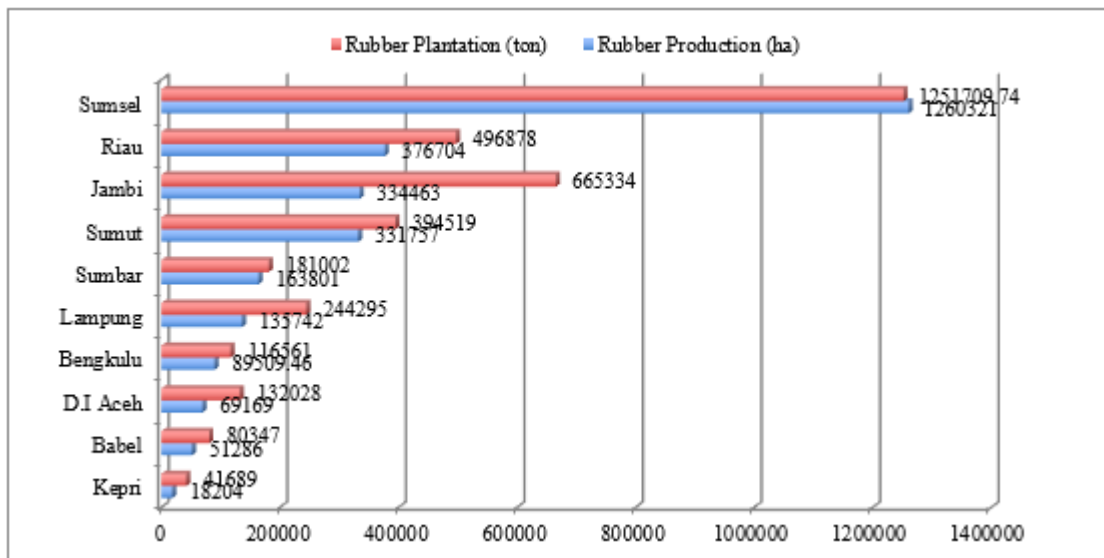


Fig. 3. Rubber production and planting area by province in Sumatera Region.

Figure 3 shows that economic potential West Sumatra rubber apparently still much smaller than South Sumatra, Riau, Jambi and North Sumatra. These top four provinces for rubber cultivation and production in the Sumatran regional region have been the center of the rubber commodity market in the central region. The results of Ansofino shows that the production center and rubber planting area of West Sumatra has been cointegrated with the Riau, South Sumatra and North Sumatra regions through rubber trading system. The vertical integration of the rubber commodity market is created with this external region, especially with Riau and South Sumatra for farmers and rubber traders in Sijunjung

and Dharmasraya districts, as well as with North Sumatra for the Pasaman region.

Table 2 provides information that there are 4.40% of households in Indonesia operating rubber plantation as their main livelihood. The number of rubber farmer households in the Sumatra region which reaches 15.15% of national households. The most rubber farmer households are found in the South Sumatra which reaches 27.93% of the existing households, and 26.1% of households in the Sumatra economic corridor, followed by Jambi and Bengkulu provinces, each of which reached 24.18% and 20.51%.

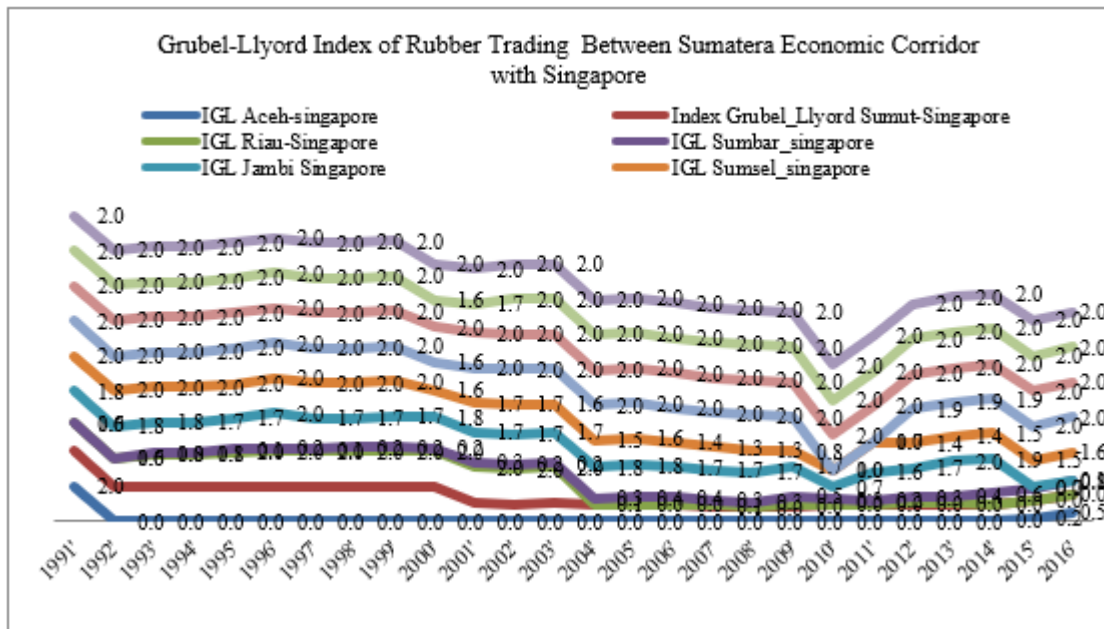
TABLE II. NUMBER OF RUBBER FARMER HOUSEHOLD IN SUMATERA ON 2017

Province	Number of household (HH)	Number of rubber farmer HH	Percentage of rubber farmer HH Karet (%)	Rubber planting area (ha)	Average of rubber land ownership (ha/HH)	Rubber production (Ton)
Sumbar	1264097	149745	11,85	181002	1,2	163800
Aceh	1231058	61972	5,03	169220	2,7	66671
Sumut	3332796	347835	10,44	405179	1,2	311099
Riau	1598305	191104	11,96	487952	2,6	355613
Sumsel	1825538	509944	27,93	1274594	2,5	1053272
Jambi	874949	211590	24,18	510721	2,4	341313
Bengkulu	487794	100064	20,51	133282	1,3	74424
Lampung	2200936	286512	13,02	274334	1,0	128741
Babel	34950	794,01	2,72	87679	1,1	51166
Kepri	52110	1711,9	3,29	25804	1,5	18204
Sumatera	12902533	1955285	15,15	3549767	1,8	2448433
Indonesia	65588400	2888542	4,40	4542094	1,6	3774000

Research result, data analysis from BPS and Agricultural Census 2013.

The average ownership of rubber land in Indonesia reaches 1.6 ha /household and in Sumatra's economic corridor reaches 1.8 ha / household. Aceh, South Sumatra, Riau and Jambi have average rubber land ownership above the national average level. However, West Sumatra, North

Sumatra and Lampung, which have been the provinces with the highest rubber production in the Sumatra corridor region have an average rubber cultivation area per household below the national average.



Research result (2018)

Fig. 4. Grubel_Llyord index of rubber trading between sumatera economic corridor with Singapore.

Base on Figure 4 that regions which have high production quantities such as North Sumatra and West Sumatra are not always identical with the average number of rubber land ownership per farmer's household. It is more determined by rubber planting area and the opportunity to intensify harvesting by opening new arable land. The high demand for rubber market makes subsistence rubber farmer has an encouragement to increase their production through extensification. It has happened in Sijunjung where the area of rubber plantation continues to increase every year.

IV. CONCLUSION

Based on the data analysis of rubber planting area and production of West Sumatra, the following conclusions can be expressed; the first the productivity of rubber farmer households in Pasaman is higher than Dharmasraya and Sijunjung. The implication of this condition is that the average land ownership per household in Pasaman district is higher than Dharmasraya and Sijunjung. Second; The economic potential of rubber in West Sumatra with its planted area and production located in 3 regencies is still lower compared to the South Sumatra, Riau, Jambi and North Sumatra. Three; West Sumatra production center and rubber planting area had been cointegrated with the Riau, South Sumatra and North Sumatra regions in the rubber trading system. The vertical integration of the rubber commodity market is created with this external region, especially with Riau and South Sumatra for farmers and rubber traders in Sijunjung and Dharmasraya districts, as well as with North Sumatra for the Pasaman region. Fourth; West Sumatra, North Sumatra and Lampung which have been the provinces with the highest rubber production in the Sumatra corridor region turned out to have an average rubber cultivation area per household below the national average. Fifth; Rubber growing centers and production areas in

Sumatra economic corridors have not had a vertical market link with the largest rubber importing countries in ASEAN. It means the exchange between the economic corridors of Sumatra and Singapore in trade rubber only occurs in one direction.

ACKNOWLEDGMENT

This research can be carried out with funding by the Ministry of Research, Technology and Higher Education, therefore the researcher thanked the Director of DRPM. To students who helped with data collection in the field and colleague lecturers who had helped sharpen the analysis, researchers gave high appreciation. Finally, thank you to researchers at the Unisba Bandung Sores conference who have provided valuable input, so that this article can be refined as it is today.

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