

# Industrialization in South Sumatera

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**Abstract**— This study uses the Kaldor’s Growth Law model to estimate the effect of the manufacturing industry sector on the South Sumatra economy. The research objective is to find out whether the industrial sector can be an engine of growth at the full employment level. The results showed that the industrial sector can take a share of 34 percent of economic growth. However, if the input factor is also allocated to the agriculture and mining sectors, the role of industry actually decreases to 14.6 percent. The role of manufacturing does not specifically accelerate the pace of economic growth in South Sumatra. This can be seen from the small and insignificant influence of the difference between the growth of manufacturing with agriculture and mining on the economic growth of South Sumatra. This means that the growth of the manufacturing sector is relatively not greater than the growth of the non-manufacturing sector or even a negative difference, which means faster growth of other sectors. The role of the industrial sector in creating employment is in line with the share of the creation of added value in the industrial sector which is also not yet encouraging in terms of the process of structural transformation. The role of the industrial sector in creating employment opportunities can be said to be insignificant.

**Keywords:** *Kaldor’s Growth Law, the manufacturing industry, economic growth*

## I. INTRODUCTION

Industrialization is one of the many paths taken by a country to spur economic growth. Many developing countries have experienced a structural transformation from an agriculture-based economy to an industry-based economy. The industrial sector is a sector that has linkages with other large sectors. The industrial sector requires inputs from other sectors and its output is also widely used by other sectors. Because it is often said that the industrial sector is an engine of growth.

If the manufacturing industry is increasingly contributing to Gross Domestic Product (GDP), then a country can be said to be experiencing industrialization. Thus, industrialization has a very concrete performance. Consequently, there is no industrialization when manufacturing does not have a significant contribution to GDP. Conversely, if it turns out that the contribution of the manufacturing industry to GDP has decreased relatively compared to other sectors of the economy, industrialization will automatically enter a turning point phase. This means, a country’s economy enters a phase of de-industrialization.

After the 1998 economic crisis until now, the manufacturing industry in South Sumatra has not been able to shift the role of the agricultural sector. At the beginning

of the economic recovery in 2003 the manufacturing sector (with oil and gas) contributed 17.55 percent to the Gross Regional Domestic Product (GRDP), while the agricultural sector contributed 19.28 percent. The mining sector became the largest contributing 29.22 percent. The new industrial sector can match the contribution of the agricultural sector in 2016 where the industrial contribution of 18.86 percent compared to the agricultural sector which amounted to 18.37. While the mining sector in 2016 contributed 19.89 percent. Only in 2017, the industrial sector can shift the role of the agricultural sector in the GRDP.

TABLE I. GROWTH RATE AND PROPORTION OF VALUE ADDED IN AGRICULTURE, SOUTH SUMATRA MINING AND INDUSTRY

Year	Growth Rate (%)			Proportion of Value Added (%)		
	Agriculture	Mining	Industry	Agriculture	Mining	Industry
2003	4.98	-0.06	4.55	19.28	29.22	17.55
2004	6.14	0.41	5.67	19.56	28.04	17.76
2005	5.88	0.42	4.75	19.76	26.86	17.74
2006	6.44	0.36	5.30	19.99	25.62	17.76
2007	6.48	0.25	5.70	20.11	24.27	17.74
2008	4.09	1.53	5.42	19.92	23.45	17.46
2009	3.11	1.62	2.07	19.73	22.89	17.12
2010	4.66	2.79	4.57	19.55	22.27	16.95
2011	5.27	2.59	5.80	19.31	21.51	16.82
2012	5.34	0.42	5.95	19.30	22.63	18.61
2013	5.26	3.21	4.10	19.29	22.19	18.39
2014	4.06	3.34	4.57	19.17	21.82	18.37
2015	3.59	3.94	5.40	18.98	21.80	18.53
2016	1.54	2.95	6.23	18.37	19.86	18.86
2017	1.77	5.32	6.55	15.86	19.09	19.52

<sup>a</sup> Source: BPS Sumsel

The added value of the agricultural sector (including the mining sector) is relatively sensitive to changes in commodity prices on international markets in influencing economic growth. This can explain why the growth of the agriculture and mining sectors has fluctuated. BI Research Palembang (2007) developed a sensitivity model for South Sumatra’s economic growth on primary commodity prices. The interpretation of the model estimate is that each 1 percent increase in the average price of rubber on the world market will create economic growth in South Sumatra by 0.19 percent, while for oil palm, every 1 percent increase in the average price of palm oil will create economic growth of 0.025 percent.

The phenomenon of industrialization in South Sumatra can be seen from industrial growth. The growth of the manufacturing industry on average in 2003 - 2009 grew by 4.49 percent per year, still below the average economic

growth in the same period of 4.76 percent. In the period 2010 - 2017 the manufacturing industry grew an average of 5.23 percent per year, also slightly below the average GRDP growth in the same period which was 5.38 percent.

However, the momentum of the development of the industrial sector in South Sumatra is coupled with competition in the allocation of inputs. Other economic activities, especially mining also use input factors of production available in the economy. Reallocation of inputs from the agricultural and industrial sectors to the mining sector will affect the development of output and the role of the industrial sector in the South Sumatra economy.

II. LITERATURE REVIEW

A. Production Theory

In the economic sense of production, then efficiency is how to produce maximum output with the use of fixed inputs or how to produce output at a certain level with the lowest possible cost.

Productivity is the ratio between the output produced and the input used. Productivity is reflected in the straight-line slope of the 0 axes at the point of output (y) and input (x). The production curve shows the maximum amount of output that can be produced at each level of input or in other words the production curve reflects the level of technology use in the company. Shows a comparison of the amount of output efficiency of a company to the maximum output that can be generated by another company at a level input the same. A company is called efficient if it operates right on the production curve line (*frontier*), namely points B and C.

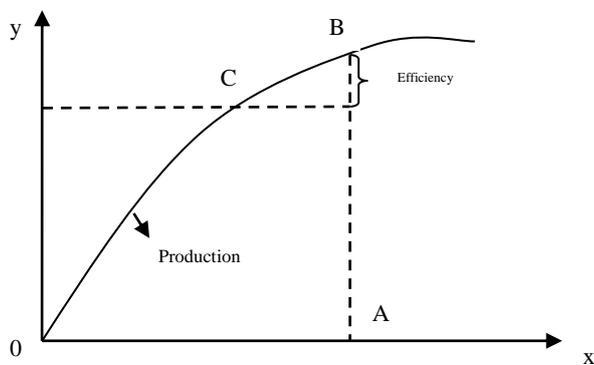


Fig. 1. Production Curve Line

B. Kaldor's Growth Theory

In relation to how the industrial sector determines economic growth, Nicholas Kaldor launched a growth theory which states that the manufacturing sector is an engine of growth for a country or region. This theory then inspired many developing countries to industrialize.

Kaldor's growth law explains the relationship between economic growth (output growth) is positively related to manufacturing sector growth or "manufacturing is the engine of growth". [6]. The relationship is formulated in the regression equation:

$$q = a_1 + b_1 m \tag{1}$$

where  $q$  is the growth of total output and  $m$  is the growth of the manufacturing sector.

In addition, Kaldor added that the specific relationship is that the greater the difference between the growth of the manufacturing sector compared to the growth of sectors other than manufacturing, the faster the growth of total output. The relationship is formulated:

$$q = a_2 + b_2 (m - nm) \tag{2}$$

where  $nm$  is the growth of sectors other than manufacturing. Kaldor also added the argument that the growth of the sector other than manufacturing was also influenced by the growth of the manufacturing sector. The relationship is formulated:

$$nm = a_3 + b_3 m \tag{3}$$

C. Industrialization

In addition to the analysis of growth, capacity industrialization can be viewed from the aspect of; (1) Proportion labor in the manufacturing sector to the total workforce. (2) Proportion of the value-added of the manufacturing industry in the formation of GDP.

In general, industrialization can be interpreted as an increase in the role of the manufacturing sector in the contribution of added value to GDP and its role in absorbing labor. In connection with the study of industrial economics within the framework of the structure - behavior - performance, the industrialization illustrates the positive performance of the industrial sector in an economy. The performance is related to productivity, competitiveness and efficiency. Conversely, de-industrialization can be interpreted as a reduction in the role of the manufacturing sector.

A more concentrated industry tends to have a higher profit than a less concentrated industry. Large companies tend to have higher profits than smaller companies. The difference between large companies and small companies tends to grow with the level of industrial concentration. The competitive view of the industrial structure shows that the increase in the level of concentration is brought about by variable cost conditions and not by changing entry barriers. Industries that experience a rapid increase in concentration must show a large gap between large and small companies due to more significant cost differences. The difference between large and small companies grows with the level of concentration, and the relationship is statistically significant. The difference between large and small companies also grows with changes in concentration. However, this relationship has no statistical significance [4].

Dewi (2010) points out the facts of the de-industrialization process. The proportion of manufacturing sector workers to total workers experienced negative growth and the share of GDP has decreased since 2002. Under the Kaldorian approach, the manufacturing sector has indeed become an engine of economic growth during the industrialization stage. The deindustrialization process that has taken place in Indonesia since 2002 tends towards a

negative direction which is marked by the low *trade balance*. This study shows that the decline in *trade balance* also contributed to the decline in the proportion of manufacturing sector workers. This indicates that the de-industrialization process in Indonesia is caused by the decline in *foreign demand* for Indonesian manufactured products. Moreover, the birth of new industrial countries, China and Korea, has further weakened Indonesia's competitiveness.

**III. METHOD**

The scope of the study is to look at the role of the industrial sector in the 2003 - 2017 observation period of the South Sumatra economy. The development of the industrial sector is also compared to the role of the agriculture and mining sectors.

The data in this study are quantitative data and are sourced from secondary data. Based on the time, the data in this study are *time series*. The data collection method is done through document search and literature review.

The method of analysis in this research is descriptive quantitative with the intention to obtain a thorough description and quantitative aspects of the variables of this study. Quantitative analysis uses the regression method by applying the Kaldor's model to South Sumatra Province data.

$$EG_t = \alpha + \beta_1 GMan_t + \beta_2 EG_{t-1} \quad (4)$$

$$EG = \alpha + \beta_1 GMan + \beta_2 GTani + \beta_3 GTambang \quad (5)$$

Where: EG is economic growth, GMan is the growth of the manufacturing industry sector, GTambang is the growth of the mining sector, with GTani is the growth of the agricultural sector.

Then based on the Kaldorian model also added a specific relationship regarding the difference between the growth of the manufacturing industry sector with other sectors. This means that industrialization will more quickly increase economic output.

$$EG = \alpha + \beta_1 GMan - GTani + GMan - GTambang \quad (6)$$

**IV. RESULTS**

The Kaldor Model in equation (1) can be applied to the case of South Sumatra's economy with the following results:

$$EG_t = \alpha + \beta_1 GMan_t + \beta_2 EG_{t-1} \quad (4)$$

$$EG_t = 1.42961 + 0.315920GMan_t + 0.432601 EG_{t-1}$$

South Sumatra's economic growth is positively related to the growth of the manufacturing sector with a coefficient of 0.315982. The growth of the manufacturing sector has a significant effect with a Prob of 0.018 < 0.05. Thus, South Sumatra's economic growth when only compared with the growth of the manufacturing sector, then shows that the manufacturing sector can be an engine of growth.

TABLE II. REGRESSION RESULTS FOR ECONOMIC GROWTH WITH MANUFACTURING GROWTH IN SOUTH SUMATRA

Dependent Variable: EG				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.429261	1.163581	1.228330	0.2450
GMAN	0.315920	0.114787	2.752232	0.0188
EG(-1)	0.432601	0.182187	2.374487	0.0369
R-squared	0.513024	Mean dependent var		5.206429
Adjusted R-squared	0.424483	S.D. dependent var		0.652317
F-statistic	5.794196	Durbin-Watson stat		1.149306
Prob(F-statistic)	0.019111			

<sup>b</sup> Source: BPS Sumsel

The adjustment was made because in the economic reality of South Sumatra the role of agriculture and mining is very important. Therefore, the Kaldor's model added the effect of the growth of the agricultural sector and the growth of the mining sector. So the model that was built:

$$EG = \alpha + \beta_1 GMan + \beta_2 GTani + \beta_3 GTambang \quad (5)$$

Regression results by including the variable growth in the agricultural sector and the growth of the mining sector:

TABLE III. REGRESSION RESULTS INFLUENCE OF AGRICULTURAL, MINING AND GROWTH INDUSTRY AGAINST THE ECONOMIC GROWTH OF SOUTH SUMATRA

Dependent Variable: EG				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.982235	1.186242	0.828022	0.4542
GTANI	0.491622	0.289747	1.696732	0.1650
GTAMBANG	0.685025	0.252268	2.715467	0.0532
GMAN	0.146926	0.249985	0.587739	0.5883
R-squared				0.746382
Adjusted R-squared				0.556168
F-statistic				3.923912
Prob(F-statistic)		0.109867		

<sup>c</sup> Source: BPS Sumsel

$$EG = 0.98223 + 0.49162 GTani + 0.68502 GTambang + 0.14692 GMan \quad (5)$$

Regression results show that the growth of the mining sector is even greater than the growth of the industrial and agricultural sectors. Economic growth will increase by 0.68 percent if the growth of the mining sector increases by 1 percent. The growth of the mining sector significantly influences economic growth with Prob 0.053 compared to the growth of the industrial sector with prob 0.58 > α = 0.05 is not significant.

In addition, Kaldor added that the specific relationship is that the greater the difference between the growth of the manufacturing sector compared to the growth of sectors other than manufacturing, the faster the growth of total output. The relationship is formulated in equation (2)

TABLE IV. REGRESSION RESULTS EFFECT OF DIFFERENCE IN GROWTH WITH MANUFACTURING SECTOR AGRICULTURE AND MINING SECTOR AGAINST ECONOMIC GROWTH SOUTH SUMATRA

Dependent Variable: EG				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.786323	0.434822	11.00754	0.0000
GM GPTN	0.070417	0.110005	0.640123	0.5341
GM GTBG	0.088775	0.116438	0.762426	0.4605
R-squared	0.063158			
Adjusted R-squared	-0.092982			
F-statistic	0.404495			
Prob(F-statistic)	0.676080			

<sup>d</sup> Source: BPS Sumsel

$$EG = 4.78632 + 0.070417 \text{ GM-GPTN} + 0.088775 \text{ GM-GTB} \quad (6)$$

Regression results show that the role of manufacturing does not specifically accelerate the rate of economic growth in South Sumatra. This can be seen from the small and insignificant influence of the difference between the growth of manufacturing with agriculture and mining on the economic growth of South Sumatra. This means that the growth of the manufacturing sector is relatively not greater than the growth of the non-manufacturing sector or even a negative difference, which means faster growth of other sectors.

In addition to the analysis of growth, industrialization capacity in Sumsel can be viewed from the aspect of: (1) Proportion of labor in the manufacturing sector to the total workforce. (2) Proportion of the value added of the manufacturing industry in the formation of GRDP.

Table 5 indicates the process of industrialization in South Sumatra's economy. Based on the analysis of Chenery (1974) the role of the manufacturing sector should increase from 17 percent to 38 percent of the GRDP in the process of changing the level of income per capita of US \$100 to US \$1000. Until 2017, the contribution of the manufacturing sector to the GRDP has only reached 19.52 percent.

The share of workers in the manufacturing industry sector to total workers has decreased since 2007 - 2015. Then it increased in 2016 by 5.37 percent or as many as 214,929 workers to 7.08 percent or 279,370 workers in 2017.

TABLE V. PROPORTION OF LABOR AND PROPORTION OF VALUE ADDED IN THE AGRICULTURE SECTOR, SOUTH SUMATRA MINING AND INDUSTRY

Year	Proportions of Labor (%)			Proportions of Value Added (%)		
	Agriculture	Mining	Industry	Agriculture	Mining	Industry
2007	62.02	0.77	5.07	20.11	24.27	17.74
2008	59.47	0.85	4.99	19.92	23.45	17.46
2009	59.60	0.80	4.90	19.73	22.89	17.12
2010	58.05	0.82	4.90	19.55	22.27	16.95
2011	57.12	1.19	4.73	19.31	21.51	16.82
2012	56.37	1.38	5.58	19.30	22.63	18.61
2013	54.69	1.49	4.95	19.29	22.19	18.39
2014	53.37	1.02	5.05	19.17	21.82	18.37
2015	54.73	1.55	4.70	18.98	21.80	18.53
2016	48.43	1.76	5.37	18.37	19.86	18.86
2017	48.24	1.30	7.08	15.86	19.09	19.52

<sup>f</sup> Source: BPS Sumsel

Based on [7], the pattern of a transformation of South Sumatra's economic structure shows several things: (i) The contribution of the agricultural sector to the GRDP has relatively decreased. In the development process, in line with Kuznets's view, the role of the agricultural sector has decreased by 30 percentage points. (ii) However, the role of the industrial sector is different from the Kuznets observational data where the contribution of the industrial sector is between 20 to 30 percent. But in South Sumatra's economy, the contribution of the industrial sector during the development process is below 20 percent.

The interesting thing is the shift in the primary sector from what was initially influenced by the agricultural sector has shifted to the mining sector, especially in the 4 main mining producing regencies, namely Muba, Mura, Lahat and Muara Enim. These two sectors cover an average of 40 percent of the total provincial GRDP value. At the district level, for Muba it was 76 percent, Mura 69 percent, Lahat 63 percent, and Muara Enim 68 percent.

Then a paradox arises when seen from the proportion of labor. The transformation of the economic structure was followed by a decline in the ability of the agricultural sector to create employment opportunities. Indeed, in the beginning the role of the agricultural sector exceeded two-thirds of the entire workforce. In the development process, the role of agriculture will decrease below 20 percent. At present in the South Sumatra economy the role of agriculture in creating employment opportunities is still relatively high. In 2007, 62.22 percent of the total workforce declined to 48.24 percent in 2017.

The role of the agricultural sector in creating employment opportunities is important because the contribution of the agricultural sector's added value to GRDP has declined below 20 percent. This means that agricultural productivity has decreased and affected the standard of living of farmers. While the mining sector is very large in its ability to create local income, its role in creating employment is relatively low.

On the other hand, the role of the industrial sector in creating employment is in line with the share of value-added creation in the industrial sector which is also not yet encouraging in relation to the process of structural transformation. The role of the industrial sector in creating employment opportunities has an increasing trend even though the increase is relatively small and far below the role of the agricultural sector. But the role of the industrial sector is still greater than the role of the mining sector in employment.

The potential of industrialization in South Sumatra shows that there are opportunities that can be developed when viewed from its contribution to South Sumatra's GRDP. The role of the industrial sector in the formation of GRDP from 2007 to 2017 experienced a relatively significant upward trend. In 2007 the industrial sector contributed 17.74 percent to 19.52 percent in 2017.

The development of the industrial sector has momentum when its contribution to GRDP can exceed the contribution of the mining sector. In 2016 the role of the industrial sector reached 18.86 percent greater than the

mining sector by 18.37 percent. Conditions in 2017 also indicate a strengthening of industrialization in which the role of industry is 19.52 percent and mining 19.09 percent.

One aspect that can hinder the momentum of industrialization in South Sumatra is the effort to build an economy that is always based on the natural resource-based development paradigm. In fact, *de facto* it can be said that the economy of South Sumatra today has moved above the support of natural resources. But going forward this strategy will not be conducive to the ambition of growth and economic equality.

First, a growth strategy based on the natural resources will lead to the emergence of Dutch disease which led to de-industrialization. The term "Dutch disease" given by The Economist magazine in 1977 The Economist released the phenomenon of Dutch Disease in which countries with natural resources showed the de-industrialization of manufacturing and agriculture industries. This was due to the reallocation of inputs to the natural resource sector and other related sectors and resulted in the depressed growth of the domestic manufacturing industry. This is also known as the "resource curse" as stated by Auty [1]. Auty then added another synthesis in the form of resource curse where there is a negative relationship between the abundance of natural resources and economic growth.

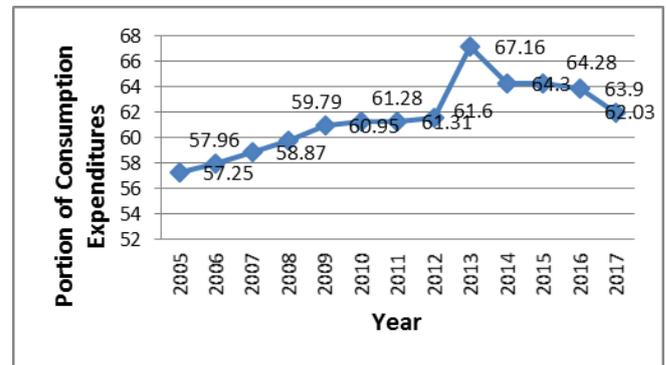
Second, related to the above, the strategy of focusing on the natural resources sector will be related to the condition of the income distribution. Given the production of goods with high natural resources intensity requires large capital and workers with specific expertise. They also are going to get an advantage in most of the sectors.

Third, the dominant role of the government in the natural resources sector will lead to an increasingly widespread outbreak of *rent-seeking* and institutional corruption in general. So that there is relatively no attempt to create added value in the industrial sector more significantly.

The symptoms of de-industrialization itself have been relatively long seen in the Province of South Sumatra (South Sumatra). This can be seen from the tendency of labor fluctuations and industrial added value as presented in the previous analysis tables. One factor thought to be the cause is the development of the natural resources and export sectors, which are mostly raw materials. Relocation of resource inputs that should be more optimally developed in the industrial sector is more absorbed in the natural resource sector.

Stagnation in the manufacturing and services sectors outside of the primary sector, the absorption capacity of the domestic economy against external shocks is fragile. The limited mechanism of sectoral reallocation as well as the local industry has resulted in the level of consumption expenditure being the only shock absorbing factor. This could result in sharp fluctuations in regional income and exchange rates that could lead to a prolonged economic crisis.

Figure 1 shows the increase in consumption expenditure that continued to increase in the period 2005 - 2013. In 2005 consumption expenditure was 57.25 percent increased rapidly to 67.16 percent in 2013. Although there was a downward trend, consumption expenditure in 2017 remained large ie 62.03 percent of total GRDP use. This shows that consumption expenditure absorbs external shocks to maintain growth momentum. This condition can be considered as an initial symptom of Dutch disease.



\* Source: BPS Sumsel

Fig. 2. Portion of Consumption Expenditure to GRDP

The structural transformation of South Sumatra's economy shows that changes in the economic structure from agriculture to industry are not based on strong efficiency and productivity in the agricultural sector first. The role of the agricultural sector in the formation of GRDP has declined, but its role in creating employment opportunities is still high.

The transformation of the economic structure that transformatively took place from agriculture to industry, what actually happened was the transformation between primary sectors, from agriculture to mining. The growth of the mining sector has significantly affected economic growth. Relatively, there was a reallocation of inputs from the agriculture and industry sectors to the natural resource sector. This is an early symptom of the deindustrialization phenomenon, especially in several mining producing agencies in South Sumatra.

**V. CONCLUSION**

The industrial sector in South Sumatra can be pushed to become an engine of growth. Although there was a decline in employment and a role in the formation of GRDP, in recent years there has been an improvement towards the industrialization process in the form of increased labor and role in the creation of added value or GRDP.

However, if added to the growth of the mining sector, the influence will be greater than the growth of the industrial and agricultural sectors. Then the results also showed that the role of manufacturing did not specifically accelerate the rate of economic growth in South Sumatra. This can be seen from the small and insignificant influence of the difference between the growth of manufacturing with agriculture and mining on the economic growth of South Sumatra. This means that the growth of the manufacturing sector is relatively not greater than the growth of the non-

manufacturing sector or even a negative difference, which means faster growth of other sectors.

Such conditions indicate the reallocation of inputs in the agricultural sector (land, capital and labor) to the natural resource sector and other sectors related to natural resource exploitation activities and resulting in depressed growth in the industrial and agricultural sectors.

The significance of the influence of the mining sector on the economic growth of South Sumatra is relatively able to reduce the capacity and potential of industrialization in South Sumatra that can actually develop in a sustainable manner. It is showing the industrialization process that proved to be more long-term benefit for the creation of added value for the economy is still facing structural constraints, which still dominancy natural resource-based development paradigm.

Therefore, the momentum to strengthen economic structural transformation must be maintained through:

- 1) Increased agricultural productivity and innovation through industrialization or downstream policy. It is time for the Province of South Sumatra to make a choice of industrialization rather than the development of land exploitation for plantation expansion.
- 2) Technological progress is a very important factor in influencing the structural transformation of the economy.
- 3) The competitiveness of the economy is closely related to exports of the processing industry.

## VI. ACKNOWLEDGMENTS

This work has been supported by Sriwijaya University and participant partners as enumerator.

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