International Journal of Research in Business and Social Science
8(4), 2019: 215-223

Research in Business and Social Science

IJRBS Vol 8 No 4, ISSN: 2147-4478

Contents available at *www.ssbfnet.com/ojs*

https://doi.org/10.20525/ijrbs.v8i4.303

Investment Improvement of Agricultural Sector in East Java: Input- Output Analysis

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Abstract

The Agricultural Demand Led Industrialization (ADLI) strategy can be considered effective because of the dominant amount of East Java land (74.11%) cultivated for the agricultural sector. This study aims to determine the relationship between the agricultural and manufacturing industry sectors; knowing the impact of the "Agricultural Demand Led Industrialization" (ADLI) strategy in the East Java economy; and knowing the elasticity of agricultural investment on output creation, gross value added, and income in East Java. This research uses the Input-Output (IO) analysis technique for all economic sectors in East Java, with an emphasis on the agricultural sector and processing industry in 1995-2010. The empirical results state that the ADLI Strategy has a positive impact on output creation and income in the East Java economy. The level of sensitivity /response from the output, gross value added, and income due to changes in investment value in the agricultural sector is relatively not much different.

Keywords: *Agriculture, Industry, Input Output, East Java*

JEL classification: O13 Submitted: 12.06.2019 Accepted: 27.06.2019

Introduction

Industrialization policies have been implemented by local government of East Java to solve the problems of poverty and income inequality. Gerbangkertosusilo industrial development program is a concrete step that shows the seriousness of regional governments in implementing industrialization to accelerate regional economic development. In accordance with the Provincial Regulation of East Java No.4 / 1996 on Province Spatial Planning (RTRW) and PP No.47 / 1996 (Pemprov Jatim, 2010) on the national spatial plan, Gerbangkertosusila aims to realize the equitable distribution of inter-regional development in East Java, and in turn the problems of poverty and income inequality can be resolved properly. Gerbangkertosusila will become the second largest metropolitan area after Jabodetabek. Gerbangkertosusila is an acronym of Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, and Lamongan which is centered in Surabaya. In addition to development programs to solve the problem, the government can adopt some strategies for implementation including Import Substitution Industrialization (ISI) strategy, Export Led Industrialization (ELI) strategy, and Agricultural Demand Led Industrialization (ADLI) (Susilowati, 2008).

ADLI strategy is considered effective because of the74.11 percent of East Java area cultivated for the agricultural sector. The economic resources controlled by most of the East Javanese society are agribusiness resources based on food crops, horticulture, plantations, fisheries, and forestry. Agribusiness development is not only based on the utilization of the abundant existing resources or relying on solely on comparative advantage, but it will gradually continue to be developed from being capital driven towards being an innovation driven agribusiness (Muryani, 2015).

Based on the background description, this study has three objectives: To discover the relationship between agricultural and manufacturing industry sectors; learning the impact of the Agricultural Demand Led Industrialization strategy on the East Javanese economy; and Understanding the elasticity of agricultural investment on output creation, gross value added, and income in East Java.

Literature Review

Industrialization is an effort to build a manufacturing industry sector to continuously create more efficiency and greater value-added to the economy. It also aims to open up employment opportunities, and contribute significantly to foreign exchange (Tambunan, 2009, Page 41). Industrialization is a path of activity to improve people's welfare in the sense of a more advanced and higher quality of life. In other words, industrial development is a function of the basic goal of people's welfare, not an independent activity just to achieve physical changes in a given area (Rokimah, 2005). Many argue that states-based industries haves an important role as a leading sector. Leading sectors in this case means those who with the existence of industrial development will spur and lift the development of other sectors such as agriculture and the services sector (Tiffania, 2008). Susilowati (2008) states that to achieve the goal of economic development there are three industrialization strategies that can be applied namely ISI, ELI and ADLI. The strategy of import substitution industrialization (inward looking) is oriented toward the creation of output to supply the domestic market, because the foreign market is already controlled by the developed countries. The implementation of the import substitution strategy is based on the idea that a high economic growth rate can be achieved through domestic industry development that produces import substitute goods. The development of import substitution is carried out by providing fiscal facilities and tariff protection. Historically Indonesia has used this strategy in the period from 1970 to 1986 (Susilowati, 2008).

The Export Led Industrialization (ELI) strategy is a principled strategy of outward looking and more oriented to the international market in an effort by developing industries in the country. Susilowati (2008) states ELI applied in Indonesia in the period after ISI, which relies on foreign capital as the growth driver. The ELI strategy widened the gap between the agricultural and non-agricultural sectors and was vulnerable to exchange rate changes. The otheralternative industrialization strategy that can be used is the Agricultural Demand Led Industrialization (ADLI), a development strategy that focuses on the agricultural development sector and makes the agricultural sector into a driver for the industrial development sector and other sectors (Adelman in Susilowati, 2008).

Research and Methodology

This research uses the Input Output (IO) analysis technique. This research was conducted in all economic sectors in East Java with emphasis on the agriculture and processing industry. The research period used was 1995-2010. However, due to the limitations of existing data, the analysis of input-output table simulations will be discussed for 2010 (Badan Pusat Statistik, 2010). In this research, the input structure of the manufacturing industry sector from agricultural sector will be shown so that the size of the contribution of the agriculture sector in forming the output of the processing industry sector can be seen. The input structure is also written in mathematical equations as follows:

$$\sum_{i=1}^{n} x_{ij} + v_j = x_j$$

For i =1,2,3,..., n

in case :

x_{ij} = there is a sector-i output that as input of sector-j

V_j = primary input of sector j

X_j = total output of sector j

The output structure used to see the contribution of the nine main sectors in East Java. From this analysis it can be determined which sectors have the largest or smallest output as well as the leading sectors in East Java economy. The output structure is also written in mathematical equations as follows:

$$\sum_{j=1}^{n} x_{ij} + F_i = X_i + M_i$$

for j =1,2,3,..., n

in case :

x_{ij} = the number of sector i outputs used as j-sector inputs

F_i = final demand for sector i

X_i = i-sector output

M_i = i-sector production import

The structure of gross value added determined by the value of output and intermediate input in the production process. Large/small outputs do not necessarily have gross value added of large/small (Dermoredjo, 2000). In this study, the structure of gross value added is written in the following equation:

$$Gross\ Added\ Value = Wages\ \&\ Salaries + Business\ Surplus + Depreciation + Indirect\ Tax + Subsidy$$

The final demand structure used to see the composition of final demand components consisting of household and non-profit consumption, government consumption, PMTB, stock changes, and exports in the East Javanese economy in 2010. The final demand can be seen from column 309 which is the sum of the columns 301 to 305.

The extraction method used to determine the importance level of the agricultural sector in the East Java economy. The working mechanism for the extraction method is created by changing the coefficient of technology by eliminating the row and column of the agricultural sector in East Java input-output table, or in other words the coefficient of technology of the agricultural sector is forced to a zero value.

Difference in output multiplier:

$$O_{j_{early}} - O_{j_{extraction}} = \sum_i b_{ij\_early} - \sum_i b_{ij\_extraction}$$

Difference in multiplier number income

$$H_{j_{early}} - H_{j_{extraction}} = \left(\sum_i w_i b_{ij}\right)_{early} - \left(\sum_i w_i b_{ij}\right)_{extraction}$$

Which means:

w_i= sector wage salary coefficient to-i

A simulation of investment in the agricultural sector can be used to see the impact of the ADLI strategy in creating output, gross value added and income for the East Javanese economy. The simulation analysis was conducted with an exogenous investment variable injection scenario consisting of PMTB (303) and stock changes (304). Investment shock is given by providing an additional investment of 5 percent of total investment into the agricultural sector. The 10 percent increase in investment is allocated proportionally to the PMTB and changes in agricultural stocks result in a new final demand framework that will be used in an impact analysis in output creation, gross value added, and income (Muryani, 2018).

In the IO analysis, an impact analysis was also used for the value of endogenous variables due to changes in the exogenous variables. This research, will involve three kinds of impact analysis: output impact analysis, gross value added, and income (Dermoredjo, 2000)

The output impact analysis is estimated by the following equation:

$$X_{FT} = (I\text{-}A)^{-1} (F\text{-}M)$$

The relationship between gross value added and output is linear, which means the increase or decrease of output will be followed proportionally by the increasing or decreasing of gross value added. The relationship can be described in the following equation:

$$V = \hat{V} X$$

In case:

V= matrix Added Value (NTB)

$\hat{V}$ = gross value-added diagonal matrix coefficient

$X = (I\text{-}A)^{-1} F^{d}$atau $(I\text{-}A)^{-1} F$

Further analysis of Input Output analysis is inference analysis. In this research, the inference analysis used Pearson correlation coefficient and a test of two average paired populations using the main data in the Gross Regional Domestic Product (GRDP) at current prices according to the quarterly business field of the East Java Province period 1995-2010 and an analysis result of the impact of output, value added and income Table Input-Output East Java Updating 2010 with classification 87 sector (Badan Pusat Statistik, 2010).

The inference analysis included an estimation of the Pearson correlation and two paired population mean tests. The Pearson correlation coefficient was used to determine the closeness of the relationship between the agricultural and manufacturing sector. Meanwhile, the two paired population tests was used to determine the influence or impact of the ADLI strategy in the East Javanese economic condition. The impact will be seen in the difference before and after the ADLI strategy is implemented. In each pair, the requirements of the two populations (treatment) are randomly assigned in homogeneous units of one million rupiah.

Results and Discussion

Input is cost incurred for goods and services used in the production process consisting of intermediate and primary input. Intermediate input is raw material for the sectors either goods or services, which are used in the production process. The purpose of the input structure analysis is to look closely at the relationship

between the agricultural and manufacturing sector. In 2010, the input required by the manufacturing sector amounted to 447,680.49 billion rupiah consisting of primary inputs of 295,893.84 billion rupiah and intermediate input 151,786.65 billion rupiah. All of the intermediate input equaled to 34,487.56 billion rupiahs, or 22.72 percent from agricultural sector. This indicates that the agricultural sector and the processing industry have a fairly close relationship (Rosgandha,2000).

Of the 43 manufacturing sectors there are fifteen sectors that have high input structures in relation to the agricultural sector. The rice sector is the largest sector that requires intermediate inputs from the agricultural sector and amounted to 15,263.18 billion rupiahs. In simple figures, 93.89% of the rice sector's input is derived from the agricultural sector. The second largest sector is the sugar sector which takes 79.71% input from the agricultural sector. The next in rank is occupied by the animal slaughtering sector with 76.56%, the flour sector 56.52%, the processing and preserving fruits and vegetables 51.94%and 10.07% of wood and rattan bamboo sector.

Based on the fifteen largest sectors, it can be concluded that the top fifteen sectors of the manufacturing industry that have input structures based on the agricultural sector are the manufacturing processing sectors closely related to the agricultural sector. These sectors are sectors that process raw materials from the agricultural sector and make them into finished products from the processing industry. The processing industry is commonly referred to as agribusiness. And these sectors are the targets for ADLI's strategy to optimize growth so that the success of the ADLI strategy can be achieved (Saikia, 2009).

Pearson Correlation Analysis

Based on table 1, the value of correlation coefficient (r) of 0.948 can be seen. This indicates a positive relationship between two variables, if the added value of the agricultural sector is greater than the added value of manufacturing sector will also increase. Viewed from the level of closeness, the agricultural sector and the processing industry have a very strong relationship (r <0.9) (Walpole, 1995).

From the correlation coefficient value, tested using test statistic, the result obtained was that H0 was rejected, or the ρ value was greater than zero. It can be concluded that with a 95% confidence level that the agricultural sector and the manufacturing industry sectors have a significant positive relationship (Walpole, 1995).

Table 1: Pearson Correlation of agriculture and processing industries East Java Year 1995-2010

Details	**Value**
(1)	(2)
Pearson Correlation	0,948
Significance (one way)	0,000
N	64

Source: SPSS processes result

Impact of ADLI Strategy Simulation in East Java Province

Impact analysis shows the influence of the ADLI strategy simulation in terms of output creation, gross value added, and income in the East Javanese economy. The impact analysis is used to observe the value of endogenous variables due to changes in exogenous variables. The results of impact analysis before and after the simulation of the ADLI strategy in terms of creating output of all sectors with complete calculation can be seen in the appendix. In this discussion a total of fifteen sectors that have the greatest change of output before and after the simulation of ADLI strategy will be shown.

The output has a reciprocal relationship with the final demand for that output. This means that the number of outputs that can be produced depends on the number of final requests.

Table 2: The fifteen largest sectors based on output changes before and after the ADLI simulation in East Java Province in 2010

Code I-O	**Sector**	**Before (Mil Rp.)**	**After (Mil Rp.)**	**Output change (Mil Rp.)**	**%**
(1)	(2)	(3)	(4)	(5)	(6)
25	Cattle	16.125,25	17.042,56	917,31	0,0704
83	Building	56.391,19	56.835,49	444,29	0,0341
84	trade, hotel and restaurant	330.622,44	331.439,64	377,40	0,0290
26	Buffalo	801,02	876,58	75,57	0,0058
72	Cement, Lime and Non-Metal Goods	20.318,96	20.376,02	57,06	0,0044
86	Real estate and corporate services	83.591,81	83.647,98	56,17	0,0043
1	Rice	27.615,98	27.670,28	54,29	0,0042
85	Transport and communication	77.866,93	77.906,20	39,27	0,0030
74	Metal Goods Manufacture	30.070,16	30.096,50	26,34	0,0020
87	Services	94.041,84	94.064,84	22,99	0,0018
38	Mining and quarrying	20.917,53	20.937,41	19,88	0,0015
2	Corn	10.544,84	10.561,17	16,33	0,0013
50	Feed	2.446,61	2.459,19	12,58	0,0010
59	Bamboo, Wood and Rattan	39.499,37	39.512,08	12,72	0,0010
17	Coffee	697,65	709,09	11,44	0,0009
	Others	488.793,71	488.886,94	92,79	0,0100
	Total	1.300.785,11	1.303.021,98	2.236,87	0,1700

Source: I-O East Java Table *Updating* 2010 (processes)

Based on these fifteen sectors, it was found that 33.33 percent comes from the agricultural sector; 26.67 percent from manufacturing sector; and the rest coming from the building sector (6.67 %); trade, hotel and restaurant sector (6.67 %); transport and communications sector (6.67 %); financial, real estate and corporate services sector (6.67 %); services sector (6.67 %) and mining and quarrying sector (6.67 %). This shows that the ADLI strategy is able to increase the productivity of the agricultural sector itself so as to mobilize other sectors to grow.

Impact Analysis in Gross Added Creation Before and After ADLI Strategy Simulation

In 2010, the sector with the biggest gross value of added impact was the cattle sector 795.50 billion rupiah or 0.1020% of total gross value added in the economy. It can be concluded that the gross value of the cattle sector could increase 795.50 billion rupiah as a result of the influence of all the components of the final demand resulting from the ADLI strategy simulation. The second ranked sector was the building sector with a change of impact of 275.71 billion rupiah or 0.0353% of total gross value added in economy. The following ranked sectors were the trade, hotels and restaurants sector; buffalo sector; rice sector; financial sector, real estate, and corporate services sector, and lastly the sugar cane sector. It also shows that the ADLI strategy can increase the East Javanese GRDP. The increase of investment in the agricultural sector can increase

the added value of the agricultural sector and its correlation is able to move other sectors that are also impacted by added value (NTB) after the implementation of ADLI strategy.

Based on fifteen sectors, it is clear that the agricultural sectors are still dominant in the added value (NTB) change due to the ADLI strategy. The results showed that the largest amount (40% of them) came from the agricultural sector, 20% from the manufacturing sector, and the rest came from the construction sector (6.67%t); trade, hotel and restaurant sector (6.67%); transport and communications sector (6.67%); financial, real estate and corporate services sector (6.67 %); services sector by 6.67 % and mining and quarrying sector (6.67 %t).

It also shows that the ADLI strategy can potentially increase the East Javanese GRDP. The addition of investment in the agricultural sector can increase the added value of the agricultural sectors themselves and can move other sectors so that they also are impacted by the added value (NTB) after ADLI strategy.

Impact Analysis in Income Creation Before and After the ADLI Strategy Simulation.

Table 3 shows total impact value of output, added value (NTB) and income before and after the ADLI strategy simulation. The ADLI simulation with investment shock of 10 percent of total investment of agricultural sector to agriculture sector has been able to create a total output in the East Javanese economy of 1.303.021,98billion or up 0.17% from total output before the ADLI simulation. This shows that the ADLI strategy can be applied to increase economic output so that it can accelerate the growth of the regional income of East Java.

Table 3: The impact of total output, Added Value (NTB), and income before and after ADLI simulation of East Java Province in 2010

Impact	**Before ADLI (Billion Rupiah)**	**After ADLI (Billion Rupiah)**	**Difference (%)**
(1)	(2)	(3)	(4)
Output	1.300.785,11	1.303.021,98	0,17
Added Value (NTB)	778.455,77	780.090,14	0,21
Income	199.811,26	200.153,94	0,17

Source: I-O East Java Table *Updating* 2010 (processes)

Elasticity Investment of Agricultural Sector on Output, Added Value (NTB), and Income

Based on IO estimation, the output has an elasticity of 0.001716. It can be interpreted that when investment in the agricultural sector increases or decreases one percent, the output of all sectors in the economy will increase by 0.001716%. Gross added value has the greatest elasticity in relation to the amount of investment into the agricultural sector. From the estimated results, it was found that added value (NTB) has an elasticity of 0.002095. A one percent increase in investment into the agricultural sector will cause the entire added value (NTB) sector to increase in economic growth by 0.002095%. Similar to outputs and added value (NTB), income also has an agricultural investment elasticity value. The income elasticity is 0.001712. This means that when investment in the agricultural sector increases or decreases by one percent, the income of all sectors in the economy will increase by 0.001712 %.

Differences in Impact before and After the ADLI Simulation

Based on the results of the average test of two paired populations, it cannot be known whether the ADLI strategy has a negative or positive influence on the economy of East Java. Therefore, the confidence intervals of each variable are used to find out.

Table 10: Calculation Results of average output difference, Added Value (NTB), and income before and after ADLI simulation

Impact	Confidence interval 95 %		t_{hitung}	df	Sig. (2-tailed)
	Below	Above			
(1)	(2)	(3)	(4)	(5)	(6)
Output					
Output-investment output	-50.284,39	-1.137,93	-2,080	86	0,041
Added Value (NTB)					
Added Value (NTB)-investment Added Value (NTB)	-38.752,8	-1.180,95	-1,870	86	0,065
Income					
Income-investment income	-7.526,58	-350,92	-2,182	86	0,032

Source: SPSS Processed Results

In regards to output variables, there is a 95% confidence interval valued between -50,284.39 and -1.137.93. Since the value interval between two negative values can be concluded that the average output before the simulation is smaller than the average output after the simulation, it can be concluded that the ADLI simulation has a positive influence on the creation of output. It also occurs in the income variable. The confidence interval for income has a significance of 5%, valued between -7,526.58 and -350.92. It can therefore be concluded that the ADLI simulation also has a positive influence on revenue generation in the East Javanese economy.

Conclusions

Input is cost incurred for goods and services used in the production process consisting of intermediate and primary input. Intermediate input is raw material for the sectors either goods or services, which are used in the production process. Of the 43 manufacturing sectors there are fifteen sectors that have high input structures in relation to the agricultural sector. Based on the fifteen largest sectors, it can be concluded that the top fifteen sectors of the manufacturing industry that have input structures based on the agricultural sector are the manufacturing processing sectors closely related to the agricultural sector. These sectors are sectors that process raw materials from the agricultural sector and make them into finished products from the processing industry. The processing industry is commonly referred to as agribusiness. And these sectors are the targets for ADLI's strategy to optimize growth so that the success of the ADLI strategy can be achieved (Saikia, 2009). Based on the results and discussions, the following can be concluded:

I. The ADLI strategy has a positive impact on the creation of output and income for the East Javanese economy.

II. The level of sensitivity/response from output, added value (NTB), and income due to changes in the value of investment in the agricultural sector is relatively similar. So, the development process based on the agricultural sector will not cause conflict between development goals, economic growth and income distribution. The growth process based on this strategy will lead to growth in line with income distribution.

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