



Subsidi Of Fertilizers, Government Expenditure, Level Of Education, Ratio Of Range And Land For Agricultural Production (District Agricultural Studies - East Java 2010-2016 With Robust Test Method Analysis LAD Least Absolut Deviation)

Abid Muhtarom^{1*}

¹University Islam Lamongan, Doctor of Science Economics Study Airlangga University.

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ABSTRACT

Agriculture is the economic sector that makes the main business field for the community of East Java regency. The problems in the agricultural sector are complex. In fact, many government policies are also implemented starting from providing fertilizer subsidies, agricultural government expenditures. There are also low levels of education and a large dependency ratio. The land area continues to decline and causes some problems also for the agricultural sector, which will affect agricultural production. Addictive Simple Analysis Method LAD Least Absolut Deviation with panel data Agriculture 29 districts in East Java 2010-2016 period. Robust Regression analysis test showed that fertilizer, government spending and the dependency ratio has a positive effect, while education levels and negatively affect the land area. However, from the value of P-value of 0.000 and smaller than $\alpha = 0.05$, it can be concluded that the predictor variables simultaneously affect the production. When viewed from the value of R² of 46.8 percent, it can be concluded that diversity in production of 46.8 percent variable determined by the diversity in the predictor variable, while the remaining 53.2 percent is determined by other factors.

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Penulis korespondensi:
E-mail: abid@unisla.ac.id

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Preliminary

East Java Province is known as a province that has a great attention on the development of agriculture. East Java Province as the largest contributor to the supply of rice, corn, sugarcane and even cattle in Indonesia. That's because food autonomy in Eastern Java for third times awarded food *Adhukarya Nusantara* (APN) years.

East Java data according to the Central Statistics Agency (BPS) can be seen in the agricultural crop land in East Java in 2010 amounted to 11, 07 276 thousand acres and transformed into 10, 91 752 thousand hectares in 2015. This resulted in an expert function of agricultural land in East Java which cause a reduction in agricultural land. If the condition is in the years to come the need for the result of agricultural resources will be deficient, therefore a solution is needed to increase agricultural production.

Efforts to increase the output of agricultural production in the district of East Java can be influenced by several input factors such as manpower, capital, land and business management. Each of these things have different functions and are related to each other. Technology also has a role in between factors of production (Daniel, 2004). Timmer (1997), Manning and Taylor (2015) using the output unit of labor as a measure of productivity.

Other factors quite important in supporting the improvement productivity bags agricultural land in villages infrastructure. Evenson and Pray (1991) say infrastructure is considered as one factor remains to contribute positively to developing harbor sector agriculture and productivity. One of infrastructure which support crop farming sector there is irrigation. The existence of good irrigation and the availability of water in the dry season for agricultural production leads to sustainable harvests. Irrigation makes agricultural land that once harvested 2-3 times a year can be increased to 3-4 times in one year, this will all affect

the amount of increased production.

The government's policy in increasing agricultural production is subsidized fertilizer price and farmer's insurance. The existence of cheap fertilizer prices because under the price of dried *gabah* per sack have an impact on the farmers using input fertilizer production is increasing. According to research conducted by Irawan, et al (2003) McArthur and McCor (2017) have found that excessive use of fertilizers per acres use standards, because farmers believe more and more fertilizers are used then the yield is increasing. Whereas the excessive use of fertilizer doses can lead to a decrease in the quality of the soil, making it more difficult for Tanami again.

In a study (Gl A Dwin, 1991) explain that the provision of fertilizer subsidies have a great impact in the management of the farm as making differentiate factor in production in Malawi better. Smale research and Heisey (1993) discuss in farm subsidy program that helps e government policies in the agricultural sector in Malawi and Cameroon. Although it makes the government's burden to pay for it, but generally build its right agricultural sector and other sectors in the economy. The duration of the education level made additional variables in this study. The longer the educated community makes a good impact for agriculture in the districts of East Java.

Literature Review

Theory of Production Functions

Production is an activity by using existing production factors to produce goods that can be used to meet the needs of consumers. Fergusson and Gould (1975) define the production function as an equation that shows the maximum number of outputs produced with certain input combinations. Thus, the factors of production on the one hand with the production on the other hand there is a relationship that is interrelated and affect. The high yields achieved and the high quality of produc-

tion produced will depend on the factors of production used. The relevance or relationship of technical acra between the production factor and the subsequent production is called the production function.

Understanding the function of the production is technically connecting relationship between factors of production or also called input or input with output or product (output) (Sudarsono, 1998). Mathematically the relationship between the amount of output (Q) with a number of inputs used in the production process ($X_1, X_2, X_3, \dots, X_n$) is formulated as follows:

$$Q = f(X_1, X_2, X_3, \dots, X_n) \quad (2.1)$$

Where Q is the output while the $X_1, X_2, X_3, \dots, X_n$ represents the input of production factors

From the description it is clear that the production function is very important in discussing economic problems, because with the production function can be known direct relationship between input and production factors (product). Besides, with the production function, it will be able to know the relationship or contribution from the production factor separately to the product (output).

The production function describes the technology used by a company, an industry or an economy as a whole. In certain technological states the relationship between input and output is reflected in the formulation of a production function. If the technology changes, it will also change the production technique.

Cobb Douglas function

In a study of industries in the United States in 1928, CW Cobb and Paul H. Douglas have used production functions that contain two factors of production, namely labor and capital. In its development Cobb Douglas function is then often used in economic analysis. Mathematically the Cobb Douglas production function can be written with the following equation

(Snyder and Nicholson, 2008) :

$$Q = f(K, L) = AK^\alpha L^\beta e^u \quad (2.2)$$

Where Q= Output, L= Labor production factor, K= Capital production factor, A= Productivity, α = elasticity of capital input and β = elasticity of labor input.

To facilitate the estimation of the Cobb Douglas function equation. The model can be transformed into a model of *double log* (natural logarithm) to:

$$\ln Q = \ln A \alpha + \beta \ln \ln K + L + u \quad (2.3)$$

A parameter is an efficiency index that reflects the relationship between the production quantity Q on the side exposed to the factors of production capital and labor together on the other. High low, A's value illustrates how many production factors are needed to produce Q (Soedarsono, 1998)

While the parameters α and β describe the elasticity of production factors of labor and capital. Besides, the amount of the value of α and β has its own meaning as well. Number of b 1 and b 2 indicate the type of prevailing production law, namely: (1) Scale the result of constant or *constant return to scale*, so called when $\alpha + \beta = 1$. This means that the addition of the factors of production (input) will be proportional to the additional production obtained output. (2) Scale with results declining or *n Decreasing Returns to Scale*, called so when $\alpha + \beta < 1$. This means that the addition of the factors of production (input) exceeds the proportion of the additional production (output). In other words doubling all inputs produces smaller outputs. And (3) Scale with increased yields or *Increasing Return to Scale*. Dsebut so when $\alpha + \beta > 1$. This means that the addition of input factors (input) will result in additional products that are larger proportions.

The above production function states that there is a quantitative relation between output and input. It is simply assumed that the input of capital and labor is the most important input in the production

process. The production function shows that output depends on the use of inputs and technological level. Thus the inputs used in the production process can be grouped into two types namely input factors of production, capital and labor while the other input is technology, efficient production techniques that can be seen through the level of productivity. The more input production factors used in the production process then the output of the industrial sector will also be more and more. Or the output of the industrial sector will increase with fixed inputs of production factors but with more productive use of inputs can be done with better production management or more efficient production techniques. So a rise in industrial sector output can be caused by using more inputs (*input driven*) or by an increase in productivity (*productivity-driven*) (Dornbusch et al 2001 and Blanchard 2001).

**Methodology
Models and data**

This study uses *Simple Analysis of LAD Least Absolout Deviation Robust Test* approach. The data used is the data panel consisting of 1421 input and output of agriculture in 29 districts in East Java in 7 years of observation (2010-2016).

Specifications of the model used was adapted from several previous studies by making adjustments considered would give better results to explain the factors increasing production of agricultural sec

tor in East Java. The model constructed a mathematical function as follows:

$$PRD = f(LND, GOV, CPT, SOC) \dots \dots \quad (3. 1)$$

Of function (1) can be modified into a linear model by using the log is as follows:

$$PRD = x_0 + x_1 LogLND + x_2 LogGOV + x_3 Log CPT + X_4 LogSOC + \varepsilon_1 \dots \dots \quad (3. 2)$$

Where : PRD= Production seen from the GRDP of the agricultural sector billions of Rupiah; LND= Land area per hectare area; GOV= (*government investment*) Government expenditures in agriculture in the budget spending by billions of Rupiah Affairs unit and the fertilizer subsidy unit of billions of rupiah; CPT= (*human capital*) Educational level views of the Old School; SOC= (*Social Indicators*) dependency ratio of the agricultural sector.

**Results and Discussion
Regression Analysis:**

Production agriculture: subsidy fertilizers, government spending, education level, the dependency ratio and land area.

The regression equation is
Weighted analysis using weights in w

production = -3206 + 0,000052 fertilizer subsidy + 0,0229 government expenditure - 120 education level + 100 dependency ratio - 62 land area
183 cases used, 20 cases contain missing values or had zero weight

Predictor	Coef	SE Coef	T	P
Constant	-3206	1509	-2,13	0,035
fertilizer subsidy	0,00005222	0,00009060	0,58	0,565
government expenditure	0,022912	0,007307	3,14	0,002
education level	-120,49	68,05	-1,77	0,078
dependency ratio	100,07	27,54	3,63	0,000
land area	-61,8	107,4	-0,58	0,566

S = 966,885 R-Sq = 46,8% R-Sq(adj) = 45,3%

Analysis of Variance					
Source	DF	SS	MS	F	P
Regression	5	145834711	29166942	31,20	0,000
Residual Error	177	165471517	934867		
Total	182	311306228			

Source	DF	Seq SS
fertilizer subsidy	1	122390826
government expenditure	1	4535984
education level	1	6383494
dependency ratio	1	12214531
land area	1	309876

Unusual Observations

Obs	fertilizer subsidy	production	Fit	SE Fit	Residual	St Resid
10	41227335000	3002,2	3087,1	962,1	-84,9	-0,88 X
60	88391520000	10931,6	5791,4	280,6	5140,2	2,06R
61	91201155000	11290,6	6360,9	263,8	4929,7	2,02R
62	92971545000	11754,4	6509,8	272,3	5244,6	2,08R
63	92893335000	11823,5	6818,1	311,6	5005,4	2,04R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage

Robust regression analysis results:

Robust regression equation:

production = - 3206 + 0,000052 fertilizer subsidy + 0,0229 government expenditure - 120 education levels + 100 dependency ratio - 62 land area

$$\hat{y} = -3206 + 0,000052 X_1 + 0,0229 X_2 - 120 X_3 + 100 X_4 - 62 X_5$$

Where \hat{y} = Production; X₁= Fertilizer Subsidy; X₂= Government Expenditure; X₃= Education Level; X₄= Dependency Ratio; X₅= Land Area

Interpretation Model:

b₁ = 0.000052 pales fertilizer subsidy rose

one unit, then the production will increase by 0.000052 units and if the fertilizer subsidy drops one unit, then the production will drop as much as 0.000052 units.

b₂ = 0.0229 means that if government spending rises one unit, then the production will increase by 0.0229 units and if government spending down one unit, then the production will drop by 0.0229 units.

b₃ = -120 means that if the education level rises one unit of production would decrease by 120 units and if education down one unit of production would rise by 120 units.

b₄ = 100 if the dependency ratio rises one unit, then the production will rise by

100 units and if the dependency ratio fell one unit, then the production will drop by 100 units.
 $b_5 = -62$ if the land rose one unit, then the production will be down by 62 units and if the land down one unit, then the production will increase by 62 units.

In the robust analysis above it can be seen that the level of education and the area of land show the opposite relationship. Educational level -120 one unit can be affected because of the higher education of the peasant population, it can be assumed that the peasant population will not work in the agricultural sector. They will function to the tertiary sector (industry and similar processing) or to the Tertiary sector (banking and transportation services). Due to the higher education population of farmers prefer to be an employee or a businessman, so that agricultural land no work because of shortage of labor which resulted in a decrease in agricultural production.

The total area of agricultural land also decreased -62 one unit and also seen from the partial t test, the variable of land area has no effect on agricultural production. This could be due to the lack of land area due to the expert function of the designation of agricultural land into residential and industrial. So that causes agricultural production decreased.

Testing partially variable Effect

1. Effect of Fertilizer Subsidy on Production
 When viewed from the value of P-value of 0.565 is greater than $\alpha = 0.05$, it can be concluded that partially fertilizer subsidy does not affect the production.
2. The Effect of Government Expenditures on Production
 When viewed from the value of P-value of 0.002 smaller than $\alpha = 0.05$, it can be concluded that partially government expenditure has a significant effect on production.
3. Effect of Education Level on Production
 When viewed from the value of P-value of 0.078 greater than $\alpha = 0.05$, it can be concluded that the partial level of education does not significantly affect the production.
4. Influence of Dependency Ratio on Production
 When viewed from the value of P-value of 0.000 is smaller than $\alpha = 0.05$, it can be concluded that the partial dependency ratio has a significant effect on production.
5. Influence of Land Area To Production
 When viewed from the value of P-value of 0.566 larger than $\alpha = 0.05$, it can be concluded that the partial land area has no effect on production.

Predictor	Coef	SE Coef	T	P
Constant	-3206	1509	-2,13	0,035
Fertilizer Subsidy	0,00005222	0,00009060	0,58	0,565
Government Expenditures	0,022912	0,007307	3,14	0,002
Education Level	-120,49	68,05	-1,77	0,078
Dependency Ratio	100,07	27,54	3,63	0,000
Land Area	-61,8	107,4	-0,58	0,566

Influence of variables simultaneously

The effect can be simultaneously seen from the following output:

Analysis of Variance					
Source	DF	SS	MS	F	P
Regression	5	145834711	29166942	31,20	0,000
Residual Error	177	165471517	934867		
Total	182	311306228			

When viewed from the value of P-value of 0.000 and smaller than $\alpha = 0.05$, it can be concluded that the predictor variables simultaneously affect the production.

Coefficient of Determination

Coefficient of determination seen from this output:

R-Sq = 46.8%

When viewed from the value of R² of 46.8 percent, it can be concluded that diversity in production of 46.8 percent variable determined by the diversity in the predictor variable, while the remaining 53.2 per cent is determined by other factors.

Conclusion

In the robust analysis above it can be seen that the level of education and the area of land show the opposite relationship. Educational level -120 one unit can be affected because of the higher education of the peasant population, it can be assumed that the peasant population will not work in the agricultural sector. They will turn functions into the tertiary sector (industry and similar processing) or to the tertiary sector (banking services and transportation). Because with higher education the farmers prefer to be employees or businessmen, so that no agricultural land is working because of the shortage of labor which resulted in the decline in agricultural production.

The total area of agricultural land also decreased -62 one unit and also seen from the partial t test, the variable of land

area has no effect on agricultural production. This could be due to the lack of land area due to the expert function of the desi-

gnation of agricultural land into residential and industrial. So that causes agricultural production decreased. Robust test regression analysis showed that fertilizer subsidy, government expenditure and dependency ratio have positive effect, while education level and land area have negative effect. However, from the value of P-value of 0.000 and smaller than $\alpha = 0.05$, it can be concluded that the predictor variables simultaneously affect the production. When viewed from the value of R² of 46.8 percent, it can be concluded that diversity in production of 46.8 percent variable determined by the diversity in the predictor variable, while the remaining 53.2 per cent is determined by other factors.

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