



# AICEDC

*4<sup>th</sup> Annual International Conference on Economic  
in Developing Countries*

*“Economy for Sustainable Development”*

October 5<sup>th</sup> - 6<sup>th</sup> 2018

PROCEEDINGS



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Jember, Desember 2018



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## Analysis Influence of Economic Variable to Agricultural Land in Java Island and Non Java Island

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### Abstract

Population density, infrastructure road and industrial income in Java and Non Java Island has increase in agricultural land that should be productive but quantity is decreasing. The purpose of the research were to determine the effect of population density, industrial income, and infrastructure road on agricultural land area. This research uses Least Square Panel method, with data from 2008 to 2015. The result of research is population density significant negative to agricultural land area in Java Island and Non Java Island. Infrastructure road has a significant positive effect on agricultural land area in Java Island, but long road infrastructure has significant negative effect to agricultural land outside Java Island. While the income of the industry has a negative effect is not significant on the agricultural land area in Java and Non Java Island

*Keywords : Land Area, GRDP Industry, Infrastructure, People Density*

### 1. Introduction

Jhingan (2014: 3), economic development is a process that can cause income per capita rill society increases in the long term. This economic development occurs because of changes, especially in the field of industry and trade. According Suryana (2000) is a growth-oriented economic development model, job creation, poverty eradication and economic development model oriented to the growth of basic needs.

For example from economic development model is infrastructure development. Limi and Smith (2007) road and irrigation infrastructure is an important role to be able streamline production and distribution in the agricultural sector. This condition causes demand for land is increasing. The other factors that cause land conversion occur are Population Density, Increasing population also causes the area of agricultural land in the area is increasingly eroded due to every inhabitant need board, clothing and food.

Population density in Indonesia can also lead to conversion of agricultural land into settlements (Nyak Ilham, et al., 2004). The unequal distribution of peasant populations between Java Island and Non Java has made some difference. (Suara.com, 2016) Java has labor intensive, while Non Java is less labor intensive. Java uses most of agricultural land to produce foods such as rice, corn and cassava. While the outside of Java Island agricultural products used for trading such as rubber, coconut, coffee pepper and others. Every population in Java Island and Non Java a place to live, so many agricultural land is converted into housing.

In addition to population density, the factors cause land conversion are industry. The large number of industrial developments in Indonesia can lead to constrict of agricultural land. The increasing number of settlements Non Java and Java Island caused a lot of demand for industrial goods and demand for labor, therefore the use of land for non-agriculture such as industry tends to be able to expand freely in this part of Indonesia (Nuryati, 1995). This research has hypothesis:

1. Population density negative effect agriculture land on Java Island and Non Java,
2. Industrial GRDP has negative effect on agricultural land in Java Island and Non Java,
3. Infrastructure road has negative effect agricultural land on Java Island and Non Java.

### 3. Methods

#### 1. Research Design or Design

The method used to explain the effect of industry, infrastructure and population density on agricultural land in Java Island and Non Java is Panel Least Square (PLS).

#### 2. Types and Data Sources

This research approach uses quantitative research. Quantitative research tends to use numbers, starting with data collection, interpretation of data and interpretation of results. The type of approach that the researcher uses is the type of quantitative description analysis approach with explanatory research (Kuncoro, 2007). The type of data used in the study is secondary data sourced from BPS data

#### 3. Population and Sample

The population of this research includes road infrastructure, industrial GDP and population density in Indonesia. Sample for this research in Java and some provinces Non Java. Period from this research 2008 to 2015.

#### 4. Research Methods

Panel data is a combination of observations time series and cross-section. There are two types of panel data in econometric analysis, balanced panel and unbalanced panel. If a subject has the same time in the observation it is called a balanced panel and if the observation time is not the same in the subject then it is called the unbalanced panel (Gujarati, 2009: 23-25).

### 4. Results and Discussion

#### Results

Based on the analysis of the effect of economic variables on agricultural land in Java and Non Java Island using panel data. Analysis of panel data used in this research is Fixed Effect. Selection of Fixed Effect analysis through test *chow dah hausman test*. The regression equation used the result of estimation of population density, industrial and infrastructure variables on agricultural land in Java and Non Java Island. The estimation results are described in the table below:

**Table 1. Fixed Effect Method Estimation Result in Java Island**

|             | C        | Population density | Industrial Income | Infrastructure |
|-------------|----------|--------------------|-------------------|----------------|
| Coefficient | 156384.6 | -47.09             | 0.697             | 54.37255       |
| t-Statistic | 2.86     | -6.85              | 0.91              | 20.89243       |
| Prob.       | 0.0068   | 0.0000             | 0.3675            | 0.0000         |
| R-square    | 0.992349 |                    |                   |                |
| Prob F      | 0.000000 |                    |                   |                |

(Source: Secondary data, 2016)

From Table 1 it can be seen that the constant value is 156384.6, when the population, industry and infrastructure density is 0, the total agricultural land is 156384.6 hectares. While the population density variables have a negative effect on agricultural land of -47.09344, meaning that when population density increases 1 person/km<sup>2</sup> it will reduce agricultural land

equal to -47.09344. The effect of significant population density on agricultural land, this can be proven with probability value 0.0000, smaller than  $\alpha$  (5%).

Industry revenue has a positive effect on agricultural land of 0.697027, meaning that when industrial income increases 1 billion will increase agricultural land 0.697027. The effect of industrial opinion is not significant on agricultural land, this can be proven with probability value 0.3675, greater than  $\alpha$  (5%).

Infrastructure variables have a positive effect on agricultural land of 54.37255, meaning that when the infrastructure increases 1 km will increase the agricultural land by 54.37255. Significant infrastructure impact on agricultural land, this can be proven with probability value 0.0000, smaller than  $\alpha$  (5%).

**Tabel 2. Result of Fixed Effect Regression Non Java**

|             | C        | Population density | Industrial Income | Infrastructure |
|-------------|----------|--------------------|-------------------|----------------|
| Coefficient | 1297236  | -1366.431          | 0.264             | -24.405        |
| t-Statistic | 8.817    | -6.459             | 0.149             | -2.294         |
| Prob.       | 0.0000   | 0.0000             | 0.8816            | 0.0274         |
| R-square    | 0.848377 |                    |                   |                |
| Prob F      | 0.000000 |                    |                   |                |

(Source: Secondary data, 2016)

From Table 2 it can be seen that the constant value is 1297236, when the density of population, industry and infrastructure is 0, the agricultural land will be worth 1297236 ha.

While the population density variables have a negative effect on agricultural land amounted to 1366.431, meaning that when the income of population increases 1 person/km<sup>2</sup> it will reduce agricultural land of 1366.431. The effect of significant population density on agricultural land, this can be proven with probability value 0.0000, smaller than  $\alpha$  (5%).

Industry revenue has a positive effect on agricultural land of 0.264545, meaning that when industrial income increases 1 billion will increase agricultural land by 0.264545. The influence of industrial opinion is not significant on agricultural land, this can be proven with probability value 0.8816, smaller than  $\alpha$  (5%).

The infrastructure variable has a negative effect on agricultural land of -24.40521, meaning that when the infrastructure increases 1 km it will reduce agricultural land by 24.40521. The influence of significant infrastructure on agricultural land, this can be proven with probability value 0.0274, smaller than  $\alpha$  (5%).

**Chow Test**

Chow Test is a test to choose whether the model approach used common effects or fixed effect in testing the stability of the parameters. Hypothesis used in this research as follows:

$H_0$ : Common Effect Model

$H_1$ : Fixed Effect Model

**Table 3. Chow Test Results Analysis of Java Island**

| Effect Test              | Statistic | Prob.   |
|--------------------------|-----------|---------|
| Cross Section F          | 16.717388 | 0.00000 |
| Cross Section Chi-Square | 54.663040 | 0.00000 |

(Source: attachment)

Based on chow test results Table 3 can be concluded that the probability of cross section F of 0.00000 is smaller than 0.05 so  $H_0$  rejected  $H_1$  accepted. So, a good model used is the Fixed Effect.

**Table 4. Results of Chow Test Analysis Non Java**

| Effect Test              | Statistic | Prob.   |
|--------------------------|-----------|---------|
| Cross Section F.         | 16.034775 | 0.00000 |
| Cross Section Chi-Square | 53.324831 | 0.00000 |

(Source: attachment)

Based on the results of chow test table 4 can be concluded that the probability of cross section F of 0.00000 smaller than 0.05 so  $H_0$  rejected  $H_1$  accepted. So, a good model used is the Fixed Effect.

### Uji Hausman

Hausman Test is used to choose which approach is appropriate to the equation model and the data between fixed effect and random effect. Hausman This test uses Chi Square values so that the decision of this panel data selection method can be determined statistically. The hypothesis of the Hausman test is as follows:

$H_0$ : Random Effect Model

$H_1$ : Fixed Effect Model

**Table 5. Results Analysis of Hausman Test Java Island**

| Test Summary         | Chi-Sq Statistic | Prob.  |
|----------------------|------------------|--------|
| Cross Section random | 2.881077         | 0.4103 |

(Source: attachment)

Based on table 5 the value of Chi-Sq.Statistic (2.881077) is greater than probability value (0.4103) so  $H_0$  is rejected and  $H_1$  is accepted, so a good model used is Fixed Effect.

**Table 6. Results Analysis of Hausman Test Non Java**

| Test Summary         | Chi-Sq Statistic | Prob.  |
|----------------------|------------------|--------|
| Cross Section random | 1.749243         | 0.6260 |

(Source: attachment)

Based on table 6 Chi-Sq value. Statistic (1.749243) is greater than probability value (0.6260)so  $H_0$  is rejected and  $H_1$  is accepted, so a good model used is Fixed Effect.

**Table 7. Results Analysis of Classical Assumption Java Island**

| Uji Diagnosis     | Test                          | Prob. ( $\alpha=5\%$ ) | Kesimpulan                      |
|-------------------|-------------------------------|------------------------|---------------------------------|
| Multikolinearitas | Correlations                  | -                      | Tidak terjadi multikolinieritas |
| Heteroskedasitas  | White test<br>(No cross term) | 0.75                   | Tidak terjadi heteroskedasitas  |
| Normalitas        | Jarque Berra-test             | 0.04                   | Terjadi normalitas              |

(Source: attachment)

Table 7 shows the test of classical assumption is not fulfilled all. Multicollinearity test results show independent variables there is no relationship between variables so that the model pass from multicollinearity. It can be seen from the correlations estimation, where the correlation value is below the boundary value of the correlation so there is no linear relationship and can explain the dependent variable in the model.

The estimation also shows that there is no problem of variance inequality from residual observation to other observations on the model so the model has homocedasticity, it is seen in the result of heterokedastisity test using white heteroschedasticity test with the result of probability value more than  $\alpha$  ( $\alpha = 5\%$ ) that is equal to 0.8510. Residual in this research model can be seen by using normality test that is Jarque-Beratest which that Jarque-Bera probability value bigger than  $\alpha$  that is equal to 0.042883 means that model is not normally distributed. Nasrul Setiawan (without years) the data is not normally distributed because the data has an outlier. So it can be seen in Java Island own data, there are outlier in that data, that is in East Java Province data itself.

**Table 8. Results Analysis of Classical Assumtion Non Java**

| Uji Diagnosis     | Test                          | Prob. ( $\alpha=5\%$ ) | Kesimpulan                      |
|-------------------|-------------------------------|------------------------|---------------------------------|
| Multikolinearitas | Correlations                  | -                      | Tidak terjadi multikolinieritas |
| Heteroskedasitas  | White test<br>(No cross term) | 0.417                  | Tidak terjadi heteroskedasitas  |
| Normalitas        | Jarque Berra-test             | 0.00                   | Terjadi normalitas              |

(Source: attachment)

Table 8 shows the test of classical assumption is not fulfilled all. Multicollinearity test results show independent variables there is no relationship between variables so that the model pass from multicollinearity. It can be seen from the correlations estimation, where the correlation value is below the boundary value of the correlation so there is no linear relationship and can explain the dependent variable in the model.

The estimate also shows that there is no problem of variance inequality from residual observation to other observations on the model so that the model has homocedasticity, it is seen in the result of heterokedastisity test using white heteroschedasticity test with the result of probability value more than  $\alpha$  ( $\alpha = 5\%$ ) that is 0.1326 . Residual in this research model can be seen by using normality test that is Jarque-Beratest which shows that Jarque-Bera probability value bigger than  $\alpha$  that is equal to 0.000000 mean that model is not normally distributed. According to Nasrul Setiawan (without years) the data is not normally distributed because the data has an outlier. So it can be seen in data outside Java Island itself, there are outliers in the data, that is in Maluku Province data.

## Discussion

This research explains the effect of economic variables on agricultural land. Based on the research results can be seen that:

1. From the regression results, the economic variables affecting the area of agricultural land in Java are population density and long road infrastructure. Population density has significant negative effect on agricultural land area in Java Island. This is in accordance with research Puspita Mega and Effendi (2014) which shows that the macro development of settlements proportioned with the increase in population did not show a positive relationship. This indicates that the trend of home ownership is not only a place to live but also as an investment.

Dhany (2014) shows that the population density in Central Java does not show a positive relationship, its because with the increasing of population density in Central Java hence can be bad impact for agricultural land in that province. Because to be able to meet the needs of the board that is home, then we also require the land to be able to build. With the increasing number of population density in a region, of course the need for home is also more and more land needed. While the available land area remains. And also with the denser settlement in Java Tengah precisely in Semarang, it will also be less and less vacant land remaining.

2. While on Non Java from the regression results the economic variables that have a significant effect on agricultural land is the population density and infrastructure. This is same with Winoto's research in Handoko (2016) in Samarinda which states that the most vulnerable agricultural land to land conversion is rice field. This is caused by the population density in rural areas that have dominant rice agroecosystems in general is much higher than dryland agro-ecosystem, so the population pressure on the land is also higher.

Rifchi Anggari, Zulfan and Husaini (2016) in addition to the level of population density that causes land conversion occurs, there are other factors that cause agricultural land is reduced, ie people in the province of Aceh precisely in Trumon Subdistrict to change the function of paddy fields into oil palm plantations is due to the quality of existing land in Trumon District is more suitable for plantation crops planted. In addition, economic factors are also the main reason people in Trumon Sub-district are converting land to oil palm plantations.

3. From the regression result, besides the economic variable of population density, there is variable of linfrastructure road affecting agricultural land area in Java Island. Long-term infrastructure road has a significant positive effect on agricultural land area, practically every increase of 1km long road construction, it can also raise 54.37255 ha agricultural land. Zaenal Effendi (2016) because a lot of underpass development or can be called a flyover, the construction of this flyover does not pass agricultural land or other vacant land. This flyover is built on a pre-existing road. This causes the area of agricultural land is not reduced for the Surabaya area.

In addition, this research same with Dwi Yanti research (2014), which states that the coefficient regression road length in Central Java amounted to 0.002469 with probability 0.2275. This indicates that the length of the road has a positive effect on wetland area and significant. That every increase of 1 km of road length, the area of rice field will increase by 0,002469%. This is because the need for roads in Central Java does not always pass the rice fields.

4. Of the regression results, Non Java has a significant negative road length relationship, it means that every 1 km increase of road length will reduce 24.40521 ha agricultural land area. This research is reinforced by the news in *riau.go.id* (2017) which states that agricultural land in Riau today has been widely converted to the interests of development, such as the development of road infrastructure, industry and community settlements. This will affect the food security that must be available as a basic necessity.

Ni Putu (2018) in Bali a lot of foreign investors who are interested to invest as the construction of toll roads in Denpasar Balu Utara. With the increasing number of road infrastructure development in Bali, it can also cause agricultural land in Bali is decreasing. This can be bad for food security in Bali. According to the local government in Bali, Bali will be more prioritizing tourism then the tourist attraction needs to be connected easily because they want as much as many can be seen tourist attraction. With the increasing number of enthusiasts for tourism, then the access road to tourism places should be

improved even better. Although it can have adverse impact on existing agricultural land in Bali Province.

5. From the regression result, PDRB of industrial sector has no significant effect to agricultural land located in Java Island. This is reinforced by research Sandi R (2009) which states that the GDP of the industrial sector does not significantly affect the conversion of agricultural land contained in Karawang. This is because agricultural industries are still largely owned by farmers, as industry opinions are increasing. Farmers only want to update technology and keep their business alive. So, the farmers in Karawang do not increase the number of their agricultural industry, so the area of agricultural land in Karawang City is not reduced.
6. From the regression result, PDRB industrial sector has no significant effect to agricultural land outside Java Island. This is reinforced by research Aditya and Theodora (2016) which states that the increase in GDP of agricultural industry in Tomohon City has no effect on agricultural land. This is because Tomohon City is a city that is a lot of development, so that even if the agricultural land increased or decreased, agricultural sector GDP in the Tomohon City continues to increase.

### 5. Conclusion

1. The population density variables Non Java Island and Java Island have a significant effect on the area of agricultural land.
2. Industry Revenue Variables Non Java Island and Java Island have an insignificant effect on agricultural land area.
3. Variable Infrastructure road length in Java Island and Non Java Island have a significant effect on agricultural land area.

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