Factors Affecting Rice Production

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Abstract. This study aims to look at the factors that affect rice production. This research was conducted in Tanah Miring District, Merauke Regency. Site selection is done deliberately (purposive). Sampling using Purposive methods as many as 88 farmers. The data used in this study include primary data and secondary data. Data were analyzed using Multiple Linear Regression Analysis. The coefficient of determination (R²) is 0.955. This coefficient of determination shows that rice production (Y) can be explained by seed variables (X1), fertilizer (X2), pesticides (X3), and labor (X4) by 95.5% while the remaining 4.5% is influenced by factors others are not included in the equation. Significant value of F equal to 0.000, namely seed variables (X1), fertilizer (X2), pesticides (X3), and labor (X4), simultaneously have a significant effect on rice production variable (Y). Partially, seeds and pesticides affect rice production while fertilizer and labor do not affect rice production. The classic assumption test shows that there are no multicollinearity, heteroscedasticity symptoms and normally distributed regression models.

Keywords: production; rice; regression; factor

1. Introduction
Indonesia is an agrarian country whose livelihoods are dominated by farmers. Indonesia has a tropical climate which has great opportunities in developing agricultural products, especially food crops. Seasonal crops are plants that are only harvested once with a relatively short plant life that is no more than one year, for example, rice, corn, tomatoes, and others. The agricultural sector is one of the sectors as a support in the development of regional agriculture, especially in Merauke and the impact of development carried out by the government can have positive or negative impacts felt by the people who receive the program.

Merauke is one of the regencies in Papua Province with an area of 46,791.63 km² and has a large planting area in the rice community of 49,322.75 ha with a harvest area of 47,444.25 ha with sufficient rice production of 208,206.38 tons so that productivity to 4.39 tons / ha in 2018.

Merauke Regency consists of 20 Districts. Of the 20 Districts, almost all Sub-districts produce rice except in 2 Subdistricts, namely Tabonji and Nguti Districts. The districts with the biggest rice production are in Kurik, Tanah Miring, Malind, and Semangga Districts. Sloping land is the second largest rice production sub-district after Kurik sub-district. Paddy production in Tanah Miring District was 61,447.50 tons with a planting area of 14,299 Ha and a harvest area of 13,655 Ha. While in Kurik
District with a production of 63,635.70 tons with a planting area of 15,584 Ha and a harvest area of 14,799 Ha. [4]

Tanah Miring sub-district has 15 villages namely Yasa Mulya village, Sumber Harapan village, Waninggap Sai village, Waninggap Miraf village, Isano Mbias, Hidup Baru village, Amunkay village, Yabamaru village, Tambat village, Ngguti Bob village, Semayam Indah village, Soa village / Senayu, Bershehi village, Sarsang village, and Kamangi village. [5]

The success of a rice farming is the production of rice produced. The resulting production will not be far from the factors that influence it, where to get increased production must be adjusted to the use of factors or inputs that are appropriate or appropriate for use both in terms of quality and price. Therefore, this study will discuss the factors that influence rice production in Tanah Miring District, Merauke Regency.

2. Methods
2.1. Method of determination of research area
The study was conducted in the Tanah Miring District of Merauke Regency. The basis for selecting research locations in the Tanah Miring District is Merauke Regency with the consideration that the Tanah Miring District is one of the Districts that has the highest amount of rice production, and therefore the research was carried out intentionally (purposive).

2.2. Method of determination of research samples
The sample is part of the number and characteristics possessed by the population [6] As for sampling using the Purposive method. The population in this study amounted to 2,561 farmers, so the determination of the sample using Slovin. Then the number of respondents was 88 farmers.

2.3. Method of collecting data
Data is used by using secondary data and primary data. Secondary data were obtained from related agencies in the study and primary data was carried out using a questionnaire and filled out by respondents in the study.

2.4. Method of data analysis
Data were analyzed using Multiple Linear Regression Analysis. The multiple linear regression equation is as follows:

\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \]

Explanation :
- \( Y \) = Rice production (Kg)
- \( \alpha \) = Intersep
- \( X_1 \) = Seeds(Kg)
- \( X_2 \) = Drugs (Kg)
- \( X_3 \) = Fertilizer (Kg)
- \( X_4 \) = Labor
- \( \varepsilon \) = Error Term
3. Results and discussions

Conformity Test (Test Goodness Of Fit) Model and Hypothesis Test. The results of the analysis of the effects of seeds, fertilizers, pesticides and labor on rice farming income are presented in the following table:

| Variable  | Regression Coefficient | Standard error | t count | Significance | Information |
|-----------|------------------------|----------------|---------|--------------|-------------|
| Constant  | -3093.025              | 528.048        | -5.857  | .000         | real        |
| Seeds     | 67.237                 | 9.030          | 7.446   | .000         | real        |
| Fertilizer| 1.531                  | .920           | 1.664   | .100         | not real    |
| Pesticide | 278.100                | 87.198         | 3.189   | .002         | real        |
| Labor     | -6.774                 | 41.016         | -.165   | .869         | not real    |

R² = 0.955
F = 0.000

3.1. Coefficient of Determination

The coefficient of determination (R²) is used to measure how much the ability of the independent variable in explaining the bound variation. The coefficient of determination (R²) obtained was 0.955. This coefficient of determination shows that rice production (Y) can be explained by seed variables (X1), fertilizer (X2), pesticides (X3), and labor (X4) by 95.5% while the remaining 4.5% is influenced by factors others are not included in the equation.

In testing simultaneously it can be used with the F test and partial testing can be done by t test, where by using α (data error rate) of 5% or 0.05. The research results can be described as follows:

3.2. Test the influence of variables

The significance value of the variables simultaneously or F is equal to 0.000, thus it can be concluded that H0 is rejected or H1 is accepted. Thus that the seed variables (X1), fertilizer (X2), pesticides (X3), and labor (X4), simultaneously have a significant effect on the rice production variable (Y).

After discussing the test variables simultaneously, a partial test of variables will be discussed. The analysis is as follows:

3.2.1. Effect of Seedlings (X1) on Rice Production (Y)

Table 1 shows that seedlings (X1) have a significance value of t of 0.01 less than α (0.05). This shows that H0 is rejected or H1 is accepted, ie seedlings (X1) partially have a significant effect on rice production (Y).

3.2.2. Effect of Fertilizer (X2) on Rice Production (Y)

Table 1 shows the significance value of t of 0.100 greater than α (0.05). This shows that H0 is accepted or H1 is rejected, ie fertilizer (X2) partially has no significant effect on rice production (Y).

Fertilizers used in this study are white fertilizer, red fertilizer and black fertilizer, where the composition of the use of fertilizers varies. This causes the use of fertilizers can not significantly affect production.

3.2.3. Effect of Pesticides (X3) on Rice Production (Y)

Table 1 shows the significance value of t of 0.02 smaller than α (0.05). This shows that H0 is rejected or H1 is accepted, that is, pesticide (X2) partially influences rice production (Y).
3.2.4. Effect of Labor (X3) on Rice Production (Y)

Table 1 shows the significance value of t of 0.869 is greater than α (0.05). This shows that H0 is accepted or H1 is rejected, ie labor (X2) partially has no significant effect on rice production (Y). The labor force used consists of workers in the family and workers outside the family. For planting, the workforce used is usually workers outside the family, for fertilization and maintenance work is done within the family and for harvesting is done by workers outside the family. The difference in the use of labor causes partially no significant effect on rice production.

The classic assumption test for rice production is presented as follows.

3.3. Classic assumption test

In the classic assumption test used is a multicollinearity test, normality test and heteroscedasticity test. The analysis is as follows:

3.3.1. Multicollinearity Test

Table 2. Test Results for the Multicollinearity Assumption of the Rice Production Model

| Model  | Collinearity Statistics |
|--------|-------------------------|
|        | Tolerance | VIF |
| (Constant) |           |     |
| Seeds   | .170       | 5.881 |
| Fertilizer | .102      | 9.793 |
| Pesticide | .184      | 5.443 |
| Labor   | .189       | 5.296 |

From Table 2 shows that each independent variable has a tolerance value (tolerance) greater than 0.1 and a VIF value smaller than 10. This shows that there is no multicollinearity. Then it can be concluded that the linear regression model of rice production is free from multicollinearity problems.

3.3.2. Heteroscedasticity Test

Heteroscedasticity test results can be seen in the figure 1.

Test results can be done by looking at the graph for the model. The distribution of residual variance points is as follows:

a. Data points spread above and below or around the number 0.

b. Data points do not collect only above or below.

c. The spread of data points cannot form a wavy pattern of spread then narrows and widens again.

d. Spread of patternless data points.

Thus showing no heteroscedasticity. Then it can be stated that the regression model of rice production is free from heteroscedasticity problems.
3.3.3. Normality Test

The residual normality test results for the linear regression model of rice production are as follows:

**Figure 1.** Heteroscedasticity Test Chart for Rice Production Models

**Figure 2.** Normality Chart of Rice Production Model
Regression models are said to be normally distributed if the plotting data (points) that describe the data actually follow a diagonal line. So, based on the picture above it can be concluded that the regression model is normally distributed.

4. Conclusions

The coefficient of determination (R²) is 0.955. This coefficient of determination shows that rice production (Y) can be explained by seed variables (X1), fertilizer (X2), pesticides (X3), and labor (X4) by 95.5% while the remaining 4.5% is influenced by factors others are not included in the equation. The significance value of F is 0.000. This shows that H0 is rejected or H1 is accepted, i.e., the seed variable (X1), fertilizer (X2), pesticide (X3), and labor (X4), simultaneously have a significant effect on the rice production variable (Y). Partially, seeds and pesticides affect rice production while fertilizer and labor do not affect rice production. The classic assumption test shows that there are no multicollinearity, heteroscedasticity symptoms and normally distributed regression models.

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