

FACTORS INFLUENCING THE PRODUCTIVITY OF WELLINGLAND RICE IN HAJU NGENDONG VILLAGE, EAST MANGGARAI REGENCY

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Abstract: This study was conducted to analyze the production factors of Land area (X_1), Seed (X_2), Fertilizer (X_3), Pesticide (X_4), Labor (X_5) that affect the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency. Then, the method used for data analysis in this study is the multiple linear regression method. The results of the study showed that the factors that significantly influenced the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency, namely land area, had a significant influence, namely the t-count value was greater than the t table ($-4.181 > 1.999$) and the significant level was less than alpha ($0.000 < 0.05$). The seed variable gave an influence, namely the t-count value was greater than the t table ($4.555 > 1.999$), and the significant value was less than alpha 0.05 ($0.000 < 0.05$). The Pesticide variable (X_3) has an influence with a t-value greater than the t-table ($-2.595 > 1.999$), and a significant value smaller than alpha 0.05 ($0.012 < 0.05$). Then the variable that has no effect is the Fertilizer variable (X_4) with a t-value smaller than the t-table ($0.091 < 1.999$), and a significant value greater than alpha 0.05 ($0.927 > 0.05$). Meanwhile, the Labor variable (X_5) has no effect with a t-value smaller than the t-table ($-1.164 < 1.999$) and a significant value greater than alpha 0.05 ($0.164 > 0.05$).

Keywords: *production factors, production, productivity*

INTRODUCTION

Indonesia is an agricultural country where most of its population works in the agricultural sector. The agricultural sector has a very vital role in supporting the progress of the national economy, national food security, and improving social and environmental welfare of the community. Various forms of support for technological innovation, as well as policies that favor the agricultural sector will have a positive impact on economic growth and the welfare of the community and farmers. One of the agricultural commodities from the food sub-sector is rice plants. For the Indonesian population, rice plants are one of the plants that are classified as primary needs that make rice a staple food, so that they are routinely cultivated by farming communities throughout the country. Thus, rice has a strategic role in contributing or supplying national food, even to this day it continues to be distributed throughout Indonesia and even exports and imports. Based on the results of previous research, the need for rice consumption to meet the needs of the population from a harvest area of 10.41 million ha with a production volume of 54.42 million tons of dry milled grain with an estimated annual consumption of 30.03 million tons (Isnawati, 2022). According to BPS Indonesia (2024), in 2020 the productivity (tons/ha) of rice in Indonesia was 5.12. In 2021 5.23. In 2022 5.24. In 2023

5.29. In 2024 5.29. Then, the productivity of rice in NTT in 2020 was 3.99. In 2021 4.18. In 2022 4.13. In 2023 4.15 and in 2024 4.19. According to BPS NTT (2025), the productivity (tons/ha) of lowland rice in East Manggarai experienced ups and downs, namely from 2020-2024. In 2020 4.11. In 2021 4.26. In 2022 4.72. In 2023 4.73. While in 2024 it is 4.60. This means that in 2024 rice productivity in East Manggarai will decrease compared to 2023. Changes in the amount of productivity reflect how various production factors interact with each other and influence the final results which are certainly influenced by production factors and external factors such as weather and climate conditions. Thus, a topic was compiled on Factors that influence the productivity of lowland rice in Haju Ngendong Village, East Manggarai Regency.

METHOD

This research is classified into quantitative research that emphasizes numerical models. The types of data used in the study are primary data and secondary data. According to Ramadhani & Bina (2021), primary data is data collected directly by researchers, and secondary data comes from related institutions. While secondary data is data collected or obtained from existing sources or intermediary media. The primary data from this study comes from research respondents. Secondary data comes from BPS and previous research results. Sample selection was carried out using the Slovin technique from 200 rice farmer populations.

$$n = \frac{N}{1 + Ne^2}$$

Description:

n = sample

N = population size

e = estimated error rate 10% (0.1)

Then: N = 200

e = 10 % (0,1)

n = 66,666.....(67)

The sample taken in this study was 67 rice farmers in Haju Ngendong Village, East Manggarai Regency. Data collection techniques were carried out by interview, documentation, and observation. Then, the research data were analyzed using multiple linear regression equations with the help of Statistical Product And Service Solutions (SPSS) software version 16.0 at alpha 0.05%.

RESULT

Socio Economic Factor

Farmer Age

Age is one of the benchmarks that describes or influences work productivity that has an impact on how to manage a farm. Table 1 shows the age of respondents in

rice farmers in Haju Ngendong Village, East Manggarai Regency as the research location.

Table 1. Respondent Age

Age	Frequency	Percentage (%)
16-30	7	10
31-45	25	37
46-60	26	39
61-75	9	13
Total	67	100

Source: processed data, 2025

Based on table 4.1 above, it explains that the age of rice farmers in Haju Ngendong Village, East Manggarai Regency varies between 15 years to 75 years. The age of farmers aged 16 to 30 years is 7 people (10%). Then, the age range of 31 to 45 years is 25 people (37%). The age range of 46 to 60 years is 26 people (39%), and the age range of 61 to 75 years is 9 people (13%).

Education level

Education is one of the supporting factors in farming, where education plays a role in improving human resources related to the mindset, knowledge and skills of farmers.

Tabel 2. Respondent Education level

Education	Frequency	Percentage (%)
Elementary School	35	52
Junior High School	8	12
Senior High School	19	28
Higher Education	5	7
Total	67	100

Source: processed data, 2025

The farmers' education varies and is dominant in Elementary School at 52% with 35 farmers. The education of farmers at the junior high school level is 12% with a total of 8 farmers. While those who have completed high school education are 28% with a total of 19 farmers, and 7% who have completed higher education are 5 people.

Long Time In Farming

Experience in the field of agriculture is the most important factor in farming and is one of the elements that play a role in the success of a farming activity.

Table 3. Respondents' length of farming

Year	Frequency	Percentage (%)
0-15	22	33
16-30	27	40
31-45	14	21
46-60	4	6
Total	67	100

Source: processed data, 2025

Considering the data, the percentage of farming varies greatly, from 0 years to 60 years. Farmers' experience in the field of rice farming starts from the age of 0 years to 15 years, which is 33% with a frequency of 22 people. Farming experience from 16 years to 30 years is 40% with a frequency of 27 people. While from 31 years to 45 years is 21% with a total of 14 farmers, and 6% have experience in rice farming between 46 years and 60 years.

Hypothesis Test

Normality test

The normality test aims to determine whether the independent variables and dependent variables in the regression model are normally distributed or not.

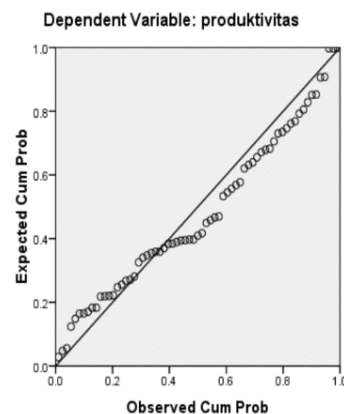


Figure 1. Data normality test

Based on the results of the normality test above, it shows that the data is spread between the diagonal lines and follows them. This means that the data depicted with a dotted pattern shows that the data is normally distributed.

Coefficient of determination

The coefficient of determination explains how the independent variable gives meaning to explain the dependent variable (model capability). The following are the results of processing research data with SPSS.

Table 4. Coefficient of determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,649 ^a	0,421	0,373	0,00001
a. Predictors: (Constant), land, seeds, pesticides, fertilizers, labor				
Source: processed data, 2025				

Table 4.5 above explains the coefficient of determination value of the processed results of SPSS 16.0. Based on the output, the R square value of 0.421 or 42.1% of the independent variables affect the dependent variable. The R square value is close to 0, namely 0.422 and is classified as weak in influencing the dependent variable. This can be interpreted that the variables Land (X_1), Seeds (X_2), Pesticides (X_3), Fertilizers (X_4), Labor (X_5) are classified as strong in influencing the productivity of rice fields in Haju Ngendong Village, East Manggarai Regency. While the remaining 57.8% is influenced by other factors outside the analysis model.

F Test

Simultaneous Test (F Test) is used to test the magnitude of the influence of all independent variables simultaneously or together on the dependent variable.

Table 5. Simultaneous test results

ANOVA ^a					
Model		Sum of Squares	df	Mean Square	F Sig.
1	Regression	0,000	5	0,000	8,862 0,000 ^b
	Residual	0,000	61	0,000	
	Total	0,000	66		

a. Dependent Variable: Produktivity

b. Predictors: (Constant), land, seeds, pesticides, fertilizers, labor

Source: processed data, 2025

Based on the results of the simultaneous test in table 4.5, it is known that the calculated F value of 8.862 is more than the F table value of 2.386 ($8.862 > 2.368$) with a significant value of 0.000 less than alpha 0.05 ($0.000 < 0.05$). This means that simultaneously H_1 is accepted and H_0 is rejected. This shows that there is an

influence of five independent variables, namely Land (X_1), Seeds (X_2), Pesticides (X_3), Fertilizers (X_4), Labor (X_5) on the dependent variable, namely productivity.

T Test

Factors that influence the productivity of lowland rice in Haju Ngendong Village, East Manggarai Regency are explained in the following table.

Table 6. Partial test results

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	0,000	0,000		7,313	0.000
land	-3,287	0,000	-0,462	-4,174	0,000
seeds	4,174	0,000	0,503	4,555	0,000
pesticides	-2,375	0,000	-0,284	-2,595	0,012
fertilizer	8,565	0,000	0,010	0,091	0,927
labor	-1,118	0,000	-0,142	-1,408	0,164

a. Dependent Variable: Produktivitiy

Source: processed data, 2025

Partially, the variables that have an influence on the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency, are land, seeds, and pesticides. Land obtained a t-count value of -4.174 and a t-table of 1.999 with a significant value of 0.000 less than alpha 0.05, so it can be concluded that there is an influence of X_1 on the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency.

Based on the partial test, it can be seen that for the variable X_2 , the t-count value was 4.555 and the t-table was 1.999 with a significant value of 0.000 less than alpha 0.05, so it can be concluded that there is an influence of X_2 on the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency.

Based on the partial test, it can be seen that for the variable X_3 , the calculated t value is -2.595 and the table t value is 1.999 with a significant value of 0.012 less than alpha 0.05, so it can be concluded that there is an influence of X_3 on the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency. Meanwhile, the variables that do not affect the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency are fertilizer and labor.

Based on the partial test, it can be seen that for the variable X_4 , the calculated t value is 0.091 and the table t value is 1.999 with a significant value of 0.927 more than alpha 0.05, so it can be concluded that there is no influence of X_4 on paddy field productivity. While the regression coefficient value for the variable X_1 is -3.287.

Based on the partial test, it can be seen that for the variable X_5 , the calculated t value is -1.408 and the t table is 1.999 with a significant value of 0.164 more than alpha 0.05, so it can be concluded that there is no influence of X_1 on the productivity of lowland rice in Haju Ngendong Village, East Manggarai Regency.

DISCUSSION

Socio Ekonomik Factor

Farmer age

The dominant age of farmers in the research area is 46-60 years old. Thus, it is indicated that there is an aging of farmers in the agricultural sector. This means that most farmers in the research area are currently of productive age but tend to be older. Those who are classified as productive age will produce optimal and more effective performance when compared to those who are non-productive and older have mature experience in managing farming businesses. According to research conducted by (Fusilawati et al., 2021), it shows that the higher the age of the farmer, the work ability will increase.

Education Level

The level of education of farmers in the research area is dominated by farmers who have graduated from elementary school, namely 52%. This shows that farmers in the research area have limited formal education, so decisions related to farm management such as cost analysis or benefit analysis or crop diversification may rely more on empirical experience than calculations or written data. Education level affects the way individuals think in understanding and processing information, thus supporting sustainable rice farming practices (Laim & Simamora, 2022).

Length of farming

Farmers in the research area have been farming for 16-30 years, reflecting a very high level of experience. Farmers with this length of farming experience have gone through various planting seasons, faced various challenges such as (pests, diseases, extreme weather, price fluctuations), and developed strong practical skills and resilience in facing agricultural risks such as crop failure. Farmers who have a lot of experience in farming have good skills and good farm management (Zogar et al., 2022).

Simultaneous Test (f)

Based on table 4.5, it shows that the variables of land, seeds, pesticides, fertilizers, and labor simultaneously (together) have a significant effect on the productivity of lowland rice. This means that in simple terms, the results of this study indicate that all input

factors used in the process of cultivating lowland rice in Haju Ngendong Village, East Manggarai Regency, starting from the area of land cultivated, the quality and quantity of seeds planted, the use of pesticides to control pests and diseases, fertilizer application for plant nutrition, to the number of workers involved are interrelated and collectively determine how much influence on the productivity of the rice produced. This strengthens previous research which states that simultaneously the variables of land area, seeds, pesticides, fertilizers, and labor have an effect on the productivity of lowland rice (Wulan et al., 2022).

Partial Test (t)

Land

The results of this study indicate that land area has a negative and significant impact on increasing rice field productivity. This is in line with the results of previous studies, namely that land area has a positive effect on rice field productivity (Noor & Isyanto, 2020). Agricultural land is a factor that determines the impact of agricultural commodities, in this case rice fields. Most farmers in Haju Ngendong Village, East Manggarai Regency have relatively large land access, with an average of 0.097 ha. With sufficient land control, they are able to increase agricultural output through efficiency in farming.

Seeds

The results of the study show that the use of seeds by rice field farmers has a positive effect on rice field productivity in Haju Ngendong Village, East Manggarai Regency. The results of this study are reinforced by previous studies that the use of seeds affects rice field productivity (Ananda & Agustina, 2025). Seed quality is the main foundation of plant productivity, especially the rice field plants studied. By using quality seeds, farmers can minimize the risk of crop failure and maximize yields per unit area.

Pesticides

The results of the study showed that the use of pesticides had a negative and significant effect on the productivity of rice fields in Haju Ngendong Village, East Manggarai Regency. This strengthens previous research that pesticide variables have an effect on rice field productivity (Sarly Riani, 2023). Pesticides or pesticides function to control Plant Pest Organisms (OPT) such as pests, diseases, and weeds that can drastically reduce yields. Without pesticides, the potential for yield loss due to pest or disease attacks can be very large. Therefore, it is necessary to imply that losses due to OPT are greater than the potential negative effects of pesticide use. This underscores the importance of effective OPT management to achieve high productivity.

Fertilizers

The results of this study indicate that the use of fertilizers does not affect the productivity of rice fields in Haju Ngendong Village, East Manggarai Regency. This is in line with previous studies showing that the use of fertilizers by farmers does not affect the productivity of lowland rice (Laim & Simamora, 2022). The fertilizer variable has no effect due to the condition of the rice fields, most of which are in swamps, so that they are naturally fertile or have adequate nutrient reserves from previous plant residues or natural organic fertilizers such as grass and straw, so that the addition of additional fertilizers does not have a significant effect.

Labor

The results of the study showed that changes in the use of labor by farmers had no effect on the productivity of lowland rice. This is because the use of labor at the research site during the research period was only used during plowing or land cultivation with a wage system. Basically, labor plays a very crucial role in encouraging increased yields. The impact of labor on rice production in Haju Ngendong Village, East Manggarai Regency is not significant, because most farmers in this area utilize labor with a mutual cooperation system, except for land cultivation. This is in line with strengthening previous research that the labor production factor does not affect production (Wulan et al., 2022).

CONCLUSION

Based on the results of the multiple linear regression analysis, it can be concluded that several production factors significantly affect the productivity of paddy fields in Haju Ngendong Village, East Manggarai Regency. The land area variable (X_1) has a significant effect, as indicated by the t-count value greater than the t-table ($-4.181 > 1.999$) and a significance level smaller than alpha ($0.000 < 0.05$). The seed variable (X_2) also has a significant effect, with a t-count value greater than the t-table ($4.555 > 1.999$) and a significance value less than 0.05 ($0.000 < 0.05$). In addition, the pesticide variable shows a significant influence, with a t-value greater than the t-table ($-2.595 > 1.999$) and a significance value smaller than 0.05 ($0.012 < 0.05$). These findings indicate that land area, seed use, and pesticide application are important determinants of paddy field productivity in the study area.

On the other hand, fertilizer (X_4) and labor (X_5) do not have a significant effect on paddy field productivity. The fertilizer variable has a t-value smaller than the t-table ($0.091 < 1.999$) and a significance value greater than 0.05 ($0.927 > 0.05$), while the labor variable shows a t-value smaller than the t-table ($-1.164 < 1.999$) and a significance value greater than 0.05 ($0.164 > 0.05$). Therefore, it can be concluded that variations in fertilizer and labor use do not significantly influence productivity in this study. Overall, the productivity of paddy fields in Haju Ngendong Village is significantly determined by

land area, seed, and pesticide factors, while fertilizer and labor factors do not show a statistically significant contribution.

Thus, to increase the productivity of lowland rice, farmers need to pay attention to and properly manage land factors, selection of quality seeds, and use of pesticides wisely and according to needs. The combination of optimal management of these three variables will provide a positive contribution to increasing the yield of lowland rice.

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