

The Effect of Production Input and Efficiency of Rice Farming in Padangguni District, Konawe Regency

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Abstract. The purpose of this study was to determine the production input and input price efficiency in rice farming in Padangguni District, Konawe Regency. The determination of the location of this study was carried out considering that in this place almost all the people are engaged in rice farming. The sample in this study was taken using a simple random sampling method with a sample size of 100 respondents. To determine the effect of the use of production inputs in rice farming in Padangguni District, Konawe Regency, regression analysis and price efficiency were used. The production factors used in the form of land, labor, seeds, fertilizers and pesticides have a significant effect on the production of rice farming in Langgea Village, Padangguni District, Konawe Regency. This shows that these production factors complement each other and are very much needed to increase the productivity of rice farming. The combination of the use of production factors for rice farming in Langgea Village, Padangguni District, Konawe Regency is not yet efficient. This is indicated by the efficiency value of each production factor which is not equal to one ($NPMxi / Pxi \neq 1$), namely; land rental efficiency value (0.94), labor (0.30), seeds (1.77) fertilizer (0.77) and pesticides (0.69). This means that the combination of the use of production factors for rice farming is still inefficient.

Keywords: Production Input, Farm Efficiency

1 Introduction

Indonesian agricultural development has been implemented gradually and sustainably with the aim of increasing agricultural production as much as possible, so that it can increase farmers' income in achieving welfare, increasing food production, increasing farmers' income and welfare. For this reason, the government together with the community must play an active role in advancing agricultural businesses in order to improve the standard of living and welfare of all Indonesian people [1]. The agricultural sector is also strategic in being a sector that improves the Indonesian economy, although agriculture has a very small contribution but agriculture is very decisive in determining the food welfare of the community [2].

Increasing food crop production aims to realize resilient agriculture. One type of food crop that continues to be developed is rice [3]. Food crop production, especially rice, needs to be increased because rice processing into rice is the staple food of 95% of the Indonesian people [4]. Until now, rice is still an important commodity in agricultural policy in Indonesia because it is related to food security and rice self-sufficiency. In the context of 13 sustainability, this aims for rice self-sufficiency, in addition to the demand side, improving the supply side is considered still relevant [5].

Rice plants are very important cultivated plants for humanity because more than half of the world's population depends on this plant as a source of food. Rice is a primary need for the Indonesian people, because it is a source of energy and carbohydrates for them. In addition, rice is also the most important crop for millions of small farmers in various regions in Indonesia [6].

The decline in rice production is caused by several aspects such as land area, number of workers, capital, availability of irrigation water, farmer insight or knowledge in farming, and the technology used. The use of inefficient production factors causes low production results. The use of production factors can be said to be efficient if it produces maximum profit. Efficiency aims to optimize production factors and sustainability and increase farmer income [7].

Farmer problems consist of underutilization of land so that it is narrow, insufficient farming capital, low worker productivity, plant pests and diseases that attack and the use of agricultural production facilities that are not optimal [8]. This is caused by a lack of understanding of farmers in terms of allocating production inputs in farming, sometimes farmers use less or more production inputs so that allocatively it is not optimal and rice

production cannot achieve maximum results. Efficiency is the ability of farming to create excess products with the use of the same inputs (production factors). The use of farming production factors that are used appropriately and efficiently will provide benefits, but with the development of the times, the area of agricultural land has begun to change function and has an impact on future production shortages and the lack of interest of millennials or the younger generation in entering the agricultural sector [9].

Farming is a production organization where farmers as entrepreneurs organize land or soil, labor and capital that are shown in production in the agricultural field, can be based on income or not. As entrepreneurs where farmers face various problems that must be decided immediately. One of these problems is what should be planted by farmers so that later the efforts made can provide profitable results, in other words the results are in accordance with what is expected [10].

Inefficient use of production factors has an impact on agricultural productivity [11]. Production input is a theory that studies how to use input or production factors to produce optimum output, in production theory it discusses the behavior of producers in using available inputs to achieve their goals. A production function will function when there are several factors that affect production output [12].

Efficiency of rice farming in paddy fields, farmers are expected to be able to adapt to climate change in farming. Farmers must have sufficient knowledge and information as well as good perceptions about climate change, varieties to be planted, planting patterns to be applied, irrigation management and the right planting time. If farmers have sufficient knowledge, it is expected that farmers will be able to manage their farming well, so that the goal of farming, namely increasing production and income, can be achieved. In order to increase production, farmers as farm managers must understand and be able to apply their production factors well, otherwise increased production will not be achieved. Therefore, the allocation of efficient use of production factors is thought to be very important in achieving maximum productivity in paddy farming [13].

Productivity and efficiency are often used interchangeably even though they are not exactly the same thing, in fact they are different. Productivity is an absolute concept and is measured by the ratio of output to input, while efficiency is a relative concept and is measured by comparing the actual ratio of input output to the optimal input output ratio. This level of technical efficiency is thought to be able to influence the level of productivity [14].

According to Kasdir Maulana [15], the problems often faced by farmers in terms of production are usually crop failures and in terms of price levels, they are usually very low selling prices for agricultural products. Therefore, farmers cannot meet the shortfall in agricultural production costs and living expenses due to losses. Other fundamental problems found are the difficulty of accessing sources of capital, information, and technology. Farmer organizations are still expected to be the main component in agricultural development, but their current condition is not yet satisfactory. A farmer is someone who works in the agricultural sector, mainly by managing the land with the aim of growing and maintaining plants such as rice, flowers, fruit and others with the hope of obtaining results from these plants for their own use or selling them to others [16].

The impact of inappropriate allocation of resources (production factors used), so that production and efficiency of farming are low. Low production and efficiency of farming as a result of non-optimal allocation of production factors will certainly result in a scale of acceptance that is not optimal, namely whether the increase in yield increases (increasing return to scale), remains constant (constant return to scale) or the increase in yield decreases (decreasing return to scale). For this reason, in efforts to increase rice production based on agribusiness, it should still be a priority. Business Scale is needed to find out whether a business being studied follows the principles of increasing, constant or decreasing return to scale [17]. Based on the background above, the purpose of this study is to determine the production input and input price efficiency in rice farming in Padangguni District, Konawe Regency.

2 Research Methods

The determination of the location of this study was carried out with the consideration that in this place almost all the people are engaged in rice farming. The sample in this study was taken using a simple random sampling method with a sample size of 100 respondents. To determine the effect of the use of inputs on rice farming production in Padangguni District, Konawe Regency, regression analysis was used.

A. Non-linear regression Cobb Douglas model with the following formula:

$$\ln Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + e_i$$

Description:

$\ln Y$ = natural log of production yield variable (kg)

b_0 = intercept

$\ln X_1$ = natural log of land area variable (ha)

$\ln X_2$ = natural log of labor variable (HOK)

$\ln X_3$ = natural log of seed variable (kg)

$\ln X_4$ = natural log of fertilizer variable (kg)

$\ln X_5$ = natural log of pesticide variable (ltr)

b1-b3 = regression coefficient
 ei = residue

B. Efficiency

a. Input price efficiency

$$NPM_{X_1} = P_{X_1}$$

$$\frac{NPM_{X_1}}{P_{X_1}} = 1$$

$$\frac{y \cdot P_y}{x_i} = P_{X_i} \text{ atau } \frac{b_i \cdot y \cdot P_y}{x_i \cdot P_{X_i}} = 1$$

b. Input Optimal

$$\frac{NPM_{X_1}}{P_{X_1}} = 1$$

$$\frac{b \cdot y \cdot P_1}{x_i \cdot P_{X_1}}$$

$$\frac{b \cdot y \cdot P_1}{x_i \cdot P_{X_1}} = x_1$$

$$\frac{b \cdot y \cdot P_1}{x_i \cdot P_{X_1}}$$

Description:

b = elasticity

y = production

Py = production price

X1 = number of production factors

Px1 = price of production factors

I = 1,2,3

If $(NPM_{X_1})/P_{X_i} > 1$ then the use of input x is not efficient. To achieve efficiency, input x must be added. If $(NPM_{X_1})/P_{X_i} < 1$ then the use of input x is not efficient. To achieve efficiency, input x must be reduced. Price efficiency can be achieved if the comparison between the marginal productivity value of each input (NPM_{X_i}) and the price of the input (V_i) or "ki" is equal to one. (Soekartawi, 2018), this condition requires NPM to be the same as the price of the production factor.

3 Results and Discussion

3.1 Regression Analysis

In its management, it is necessary to know whether the use of these production factors has an effect or not on the sustainability of the farming business of respondent farmers in Langgea Village, Padangguni District, Konawe Regency. The production function is a physical relationship between the explained variable (Y) and the explanatory variable (X). The explained variable is usually in the form of output and the explanatory variable is usually in the form of input. To find out the factors that have a real effect on production, the Cobb-Douglas production function is used using multiple regression analysis tools.

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 = \ln X_5 + e_u$$

Table 1. Results of Cobb-Douglas Production Function Regression Analysis of Lowland Rice Farming in Padangguni District, Konawe Regency.

Variable	Coefficient Regression	Std. Error	tcount	T sig
Konstanta	1,750	3,113	5,622	0,000
Land (Ln.X1)	4,978	0,428	0,205	0,031
Labor (Ln.X2)	-8,988	0,597	0,365	0,714
Seed (Ln.X3)	1,957	0,886	0,477	0,035
Fertilizer (Ln.X4)	-4,844	0,523	0,307	0,019
Pesticide (Ln X5)	-3,789	0,34	0,372	0,021

R² = 0,853

F_{hitung} = 20,063

F_{tabel} α 0,05 = 3,98

t_{tabel} α 0,05 = 2,8748

Level Of Trust 95 %

Source: Primary Data Processing Results, 2024.

Based on the results of the regression analysis in Table 1 above, the following regression equation was obtained:

$$\ln Y = 1,750 + 4,978 \ln X_1 - 8,988 \ln X_2 + 1,957 \ln X_3 - 4,844 \ln X_4 - 3,789 \ln X_5 + \epsilon$$

3.2 Analysis of Efficiency of Use of Production Factors

The results of the analysis of the allocative efficiency of the production factors can be seen in the following table:

Table 2. Results of Analysis of Efficiency of Use of Production Factors of Paddy Farming in Padangguni District, Konawe Regency

Production Factors	Elasticities (b)	Number Of Production Factors (Xi)	production factor prices (Px)	Prod. (y)	production price (Py)	b.y.Py	Xi.Px	b.y.Py /Xi.Pxi
Land rent	4,978	1	90.100.000	4.370	3.900	84.840.054	90.100.000	0,94
Labor	8,988	1	505.500.000	4.370	3.900	153.182.484	505.500.000	0,30
Seeds	1,957	1	18.837.000	4.370	3.900	33.353.151	18.837.000	1,77
Fertilizer	4,844	1	106.577.400	4.370	3.900	82.556.292	106.577.400	0,77
Pesticides	3,789	1	94.000.400	4.370	3.900	64.575.927	94.000.400	0,69

Source: Primary Data Processing Results, 2024.

Based on table 2 above, the comparison between marginal product and price for each production factor, the efficiency value is not equal to one ($NPM_{xi}/P_{xi} \neq 1$). This means that the use of production factors in the form of land rent, labor, seeds, fertilizers and pesticides in rice farming in Langgea Village, Padangguni District is not yet efficient. Thus, the combination of the use of production factors in rice farming in the form of land rent, labor, fertilizers and pesticides has an efficiency value less than one ($NPM_{xi}/P_{xi} < 1$), so the production factors used must be reduced. While the use of seed production factors has an efficiency value greater than one ($NPM_{xi}/P_{xi} > 1$). then the production factors used must be added to be efficient.

3.3 Optimization Level of Use of Production Inputs in Lowland Rice Farming

The optimization level of production inputs is generated from the ratio of the marginal product value (NPM) to the price of each production input (Pxi). The prices of production inputs are respectively the rent of cultivated land of Rp 850,000/Ha, labor of Rp 75,000/HOK, seeds of Rp 3,500/Kg, Urea fertilizer of Rp 1,800/Kg, SP 36 fertilizer of Rp. 2,300/Kg, NPK fertilizer of Rp 2,300/Kg, insecticide of Rp 257,000/Ltr, herbicide of Rp. 234,000/Ltr and fungicide of Rp 280,000/Ltr and the average production price of Rp 3,900/Kg, then the optimization level value of each production input can be obtained in Table 3 below:

Table 3. Optimal Use of Rice Farming Production Inputs in Padangguni District, Konawe Regency

Variable	Input Usage t	Optimal Use	information
Land Lease (X1)	Rp.850.000	Rp.797.400	Optimal
Labor (X2)	67,40 HOK	46,97 HOK	Optimal
Seed (X3)	53,82 Kg (Rp.3.500)	40 Kg (Rp.8.340)	Optimal
Urea Fertilizer(X4)	192,1 Kg	147,14 Kg	Optimal
SP36 Fertilize(X5)	106,47 Kg	82,58 Kg	Optimal
NPK Fertilizer(X6)	211,2 Kg	162,2 Kg	Optimal
Insecticide (X7)	1,21 Liter	0,83 Liter	Optimal
Fungicide (X8)	0,885 Liter	0,515 Liter	Optimal
Herbicide (X9)	1,251 Liter	0,861 Liter	Optimal

Source: Primary Data Processing Results, 2024.

Based on table 3 above, it can be explained that the amount of optimal use of production factors for rice farming to achieve optimal results is the use of land rental production factors of Rp. 797,400,-/Ha/MT, the use of labor production factors of 46.97 HOK/Ha, the use of seed production factors of 40 Kg/Ha using certified superior seeds at a price of Rp. 8,340,-/Kg, Use of urea fertilizer production factors of 147.14 Kg/Ha, use of SP 36 fertilizer production factors of 82.58 Kg/Ha, use of NPK fertilizer production factors of 162.2 Kg/Ha, use of insecticide production factors of 0.83 ltr/Ha, use of fungicide production factors of 0.515 ltr/Ha and maximum use of herbicide production factors of 0.861 ltr/Ha.

4 Conclusion

Based on the results of the previous analysis and discussion, the following conclusions can be drawn:

- a. The production factors used in the form of land, labor, seeds, fertilizers and pesticides have a significant effect on the production of paddy farming in Langgea Village, Padangguni District, Konawe Regency. This shows that these production factors complement each other and are very much needed to increase the productivity of paddy farming.
- b. The combination of the use of production factors for paddy farming in Langgea Village, Padangguni District, Konawe Regency is not yet efficient. This is indicated by the efficiency value of each production factor which is not equal to one ($NPMxi / Pxi \neq 1$), namely; the efficiency value of land rent (0.94), labor (0.30), seeds (1.77) fertilizer (0.77) and pesticides (0.69). This means that the combination of the use of paddy farming production factors is still inefficient.

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