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EFFICIENCY ANALYSIS OF PRODUCTION FACTORS UTILIZATION IN RICE FARMING IN SAWAH LUHUR URBAN VILLAGE KASEMEN SUBDISTRICT

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ABSTRACT

Rice plants are an important commodity, particularly in Indonesia, but their productivity often fluctuates. These fluctuations can be attributed to the use of production factors by farmers. This study aims to determine the impact and efficiency of the use of production factors (seeds, labor, pesticides, and fertilizers) in rice farming in Sawah Luhur Urban Village. The type of research conducted is quantitative descriptive research through a survey. The location selection was done intentionally or purposively. The chosen research location is Sawah Luhur Urban Village, Kasemen Subdistrict, in the Municipality of Serang, Banten, which is the largest rice producer in Kasemen Subdistrict. The research instrument used was a questionnaire, and the data collection methods used were interviews and observations. The study involved 90 respondents selected through simple random sampling. Data were processed using the Cobb Douglas production function with multiple regression analysis and price efficiency analysis methods. The results of this study indicate that 1) the simultaneous use of seeds, labor, pesticides, and fertilizers significantly affects production output where it is indicated by the F test statistic which has a value greater than th F critical value. Partially, only the use of fertilizers has a significant impact this is indicated by only the fertilizer having a calculated t test statistic greater than the t critical value. 2) The efficiency of using seeds, labor, and pesticides as production factors is inefficient, while the use of fertilizers is not yet efficient.

Keywords: *Production, Cobb-douglas, Price Efficiency, Input*

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INTRODUCTION

Agriculture is a sector that has an important role in national development. Agriculture is not only a tool to fulfill human food but also a source of livelihood for the majority of Indonesia's population. Agriculture in a broad sense can be said to be all activities that include the utilization of plants, animals and microorganisms to meet human needs and interests.

The agricultural sector includes the food crops sub-sector, horticulture sub-sector, fishery sub-sector, livestock sub-sector and forestry sub-sector. In the early stages of development, the agricultural sector was the backbone of the economy, because agriculture made a large contribution. One of the most important agriculture is food crops where one of them is rice. Rice plants are plants that will later produce rice which is one of the staple foods that can be considered the most important for people, especially in Indonesia. Almost the entire population of Indonesia consumes this staple food to meet their food needs.

The people of Banten Province are one of the provinces that consume rice as food. It can be seen that in 2021 the rice harvest area will reach 319,558.43 hectares. During the last five years starting from 2017-2021 Banten Province both harvested area, production and rice productivity have been very fluctuating and even tended to decrease. The city of Serang is one that produces enough rice to meet demand.

Every year, the harvested area in Serang City fluctuates, both growing and shrinking. A decrease in the amount of land harvested in the City of Serang in 2018 led to a drop in production of up to 13,564 tons. Up until 2020, the harvested area, production, and productivity all increased; however, they will all start to decline once more in 2021.

The fulfillment of rice production in Serang City is fulfilled by several sub-districts, namely Curug, Walantaka, Cipocok Jaya, Serang, Takakan, and Kasemen. The largest sub-district in rice production in Serang City is Kasemen Sub-District where in 2021 Kasemen Sub-District produces 44,893 tons of rice from 87,726 tons and has the largest harvest area, which shows that Kasemen Sub-District is the central of rice production in Serang City.

Table 1 Harvested Area, Productivity, and Rice Production in Kasemen District, 2017 - 2021

Years	Harvested Area (Ha)	Production (ton)	Productivity (ton/ha)
2017	6.855	38.395	5,701
2018	5.050	27.876	5,52
2019	7.560	44.368	6,08
2020	7.980	51.997	6.98
2021	7.445	44.893	6.03

Source: Dinas Pertanian Kota Serang, 2022.

According to Table 1, the harvested area, production, and productivity of rice in the Kasemen Sub-District are all highly variable from 2017 to 2021. The Kasemen Sub-

District's rice harvesting area has decreased drastically in 2021, which has also led to a sharp decline in production from the previous year. Farmers' usage of production factors may be the cause of these changes. Land area, seeds, labor, fertilizers, and pesticides are production parameters that are typically associated. Of course, in order to meet the demand for rice, rice must be produced by farming business players, and in order for the farming business to be sustainable, it must be taken into account during the process.

Research conducted by Amat Muhyidin (2010) showed the results that land area, fertilizers, pesticides, and labor had an effect on rice production. Arief Rachman's research (2014) also shows that based on data processing, the results show that the variables that significantly affect rice production are land area, seeds, fertilizer, and labor.

Based on data from the Agricultural Extension Center of Kasemen Subdistrict and an analysis of the problems with rice production and productivity in Kasemen Subdistrict, which fluctuated and tended to decline, Sawah Luhur Urban Village was one of the subdistricts affected by fluctuating productivity and the largest in rice production. So, in order to meet the need for rice, the staple food in Indonesia, the researcher plans to investigate whether farming practiced by farming actors in the application of production factors in Sawah Luhur Urban Village, Kasemen Sub-District, which is the largest rice producer in Serang City, is efficient.

METHODS

The type of research conducted is descriptive quantitative research by survey. The location selection is done intentionally or purposively. The research location chosen was Sawah Luhur Urban Village, Kasemen Subdistrict, Banten. Where Sawah Luhur Urban Village is the largest rice producer in Kasemen Sub-District. The Research was conducted from December 2022 to July 2023.

The population in this study were rice farmers in Sawah Luhur Urban Village, Kasemen Sub-District, where the number of rice farmers was 940 farmers. The results obtained from the slovin formula with an error tolerance of 10% are 90 farmers. In determining the respondents, simple random sampling will be use with the consideration that the farmers have the same characteristics both in the expanse of land and the same technology.

To help researchers conceptually measure the variables used, namely rice production (Y), seeds (X1), labor (X2), pesticides (X3), fertilizers (X4).

The Cobb-Douglas function analysis with the regression approach is used in conjunction with statistical tests (the f test and the t test) to address the question of how to identify variable y as a result of the impact of variable x. An efficiency test was conducted to address efficiency level. Data processing to get a model of the function was performed with SPSS software.

RESULTS AND DISCUSSSION

Analysis of the Cobb Douglas production function was examined using multiple linear regression methods. Multiple linear regression analysis on rice farming in Sawah Luhur Urban Village was perform using the SPSS program. The following results from the multiple linear regression analysis test can be seen in Table 2.

Table 2 Results of Multiple Linear Analysis

Variable	Regression Coefficient	Std. Error
(Constant)	-3,777	0,203
Seeds	-0,136	0,089
Labor	0,052	0,063
Pesticides	0,002	0,021
Fertilizers	0,971	0,074
R^2	= 0,931	
F statistic	= 288,477	
F critical value	= 2,478	

Sumber : Primary Data, 2023

Based on the results of the analysis in Table 2, a regression equation can be formed as follows:

$Ln\ Y = -3,777 + -0,136\ X_1 + 0,052\ X_2 + 0,002\ X_3 + 0,971\ X_4$

The regression function model is still in the form of natural logarithms, so it is necessary to re-transform it into the form of the Douglas Cobb function. Mathematically it can be written as follows:

$Y = 0,023\ X1^{-0,136}\ X2^{0,052}\ X3^{0,002}\ X4^{0,971}$

The result of the coefficient of determination (R2) is also known to be 0.931. This coefficient of determination indicates that the variables of seeds, labor, pesticides, and fertilizers can explain 93.1% of production, while the remaining 6.9% is influenced by errors or other factors. The calculation result of the regression coefficient is equal to 0.889, where 0.889 is a value less than 1. This shows that the scale of rice production is stated in the condition of decreasing return to scale, where the production scale when doubling inputs for production produces a doubling of production output which is decreasing.

F Test

The f test analysis was carried out to find out how the independent or independent variables influence the dependent variable together. In this study, to f test by looking at the value of f statistic and f critical value, is the f statistic greater or less than the f critical value.

It can be seen in Table 2 based on the regression analysis that the calculated f statistic is 288.477 and the f critical value at an error rate of 5% is 2.478, where the

calculated f statistic is greater than f critical value. This shows that H0 is rejected. So that the f test analysis shows that production inputs or independent variables that are used simultaneously or simultaneously have a significant effect on rice production in Sawah Luhur Urban Village.

T Test

The t-test analysis was carried out to find out how the independent or independent variables influence the dependent variable partially. In this study for the t test by looking at the value of t statistic and t critical value whether t statistic is greater or less than t critical value. In this analysis it can also be seen that the value of the regression coefficient or bi partially in the regression equation can show the value of production elasticity.

Table 3 T Test Result

Variable	T Statistic	T Critical Value	Sig	Regression Coefficient
Seeds	-0,533	1,988	0,129	-0,136
Labors	0,821	1,988	0,414	0,052
Pesticides	0,085	1,988	0,933	0,002
Fertilizers	13,130	1,988	0,000	0,971

Sumber : Primary data, 2023

Seed

Based on the results of the seed input t test, the calculated t statistic is -0.533. The calculated t statistic obtained is smaller than the t critical value, which is equal to 1.988, which indicates that H0 is accepted, namely the independent variables tested partially have no significant effect on the dependent variable. This can also be seen from the significance value of 0.129 which is greater than 0.05 which indicates that H0 is accepted. These results also showed that the value of the seed regression coefficient was negative, namely -0.136. This shows that there is an inverse relationship between seed and production variables where every 1 percent addition of seed and other factors considered constant will reduce yield by 0.157 percent.

Labor

Based on the results of the labor input t test, the calculated t statistic is 0.821. The calculated t statistic obtained is smaller than the t critical value, which is equal to 1.988, which indicates that H0 is accepted, namely the independent variables tested partially have no significant effect on the dependent variable. This can also be seen from the significance value of 0.414 which is greater than 0.05 which indicates that H0 is accepted. These results also obtained a positive value of the seed regression coefficient of 0.052.

This shows that every 1 percent addition of labor and other factors considered constant will increase yields by 0.052 percent.

Pesticide

Based on the results of the pesticide input t test, the calculated t statistic was 0.085. The calculated t statistic obtained is smaller than the t critical value, which is equal to 1.988, which indicates that H0 is accepted, namely the independent variables tested partially have no significant effect on the dependent variable. This can also be seen from the significance value of 0.933 which is greater than 0.05 which indicates that H0 is accepted. These results also obtained a positive value of the seed regression coefficient of 0.002. This shows that every 1 percent addition of labor and other factors considered constant, will increase yields by 0.002%.

Fertilizer

Based on the results of the pesticide input t test, the calculated t statistic was 13.13. The calculated t statistic obtained is greater than the t critical value, which is equal to 1.988, which indicates that H0 is rejected, namely the independent variable tested partially has a significant effect on the dependent variable. This can also be seen from the significance value of 0.000 which is less than 0.05 which indicates that H0 is rejected. These results also obtained a positive value of the seed regression coefficient of 0.971. This shows that every 1 percent addition of fertilizer and other factors considered constant will increase yields by 0.971%.

Efficiency Analysis Of Production Factors Utilization

The efficiency of the use of production factors can be seen or calculated using price efficiency, namely when the ratio of the value of the marginal product to the price of the input is equal to 1, or when the value of the marginal product is equal to the price of the input. The results of the analysis of the efficiency level of the use of production factors for rice farming in Sawah Luhur Urban Village can be seen in table 4.

Table 4 Results of Price Efficiency Analysis of Rice Farming

Variable	NPMxi	Pxi	Efficiency	Efficiency Level
Seed	-165.138,49	8.906,39	-18.54	not efficient
Labor	25.982,27	182.698,55	0.142	not efficient
Pesticide	20,76	192.29	0.107	not efficient
Fertilizer	70.107,23	2.857.75	24.532	not yet efficient

Sumber: Primary Data, 2023

The results of calculating price efficiency in Table 4. show that seeds, labor, and pesticides have an efficiency value of less than 1 which indicates inefficiency. So the use

of inputs from seeds, labor, and pesticides needs to be reduced. While fertilizer input has an efficiency value of more than 1 indicating it is not yet efficient, then the use of input from fertilizer needs to be added.

CONCLUSIONS AND RECOMENDATION

Conclusions

Based on the results of the research and discussion of the efficiency analysis of the use of production factors, the following conclusions can be drawn:

1. The use of factors of seed production, labor, pesticides, and fertilizers simultaneously affect rice production. While partially, only fertilizer input has a significant effect on rice production.
2. The use of factors of seed production, labour, and pesticides is not efficient. While the use of fertilizer production factors has not been efficient.

Recommendation

1. The use of fertilizer inputs has a significant effect and has a positive elasticity value on lowland rice production in Sawah Luhur Village. So the use of these inputs should be increased to increase production levels to the point where the addition of inputs is no longer worth the benefits produced.
2. Rice farmers in Sawah Luhur Urban Village need to pay attention to the use of seed inputs, labor, and pesticides. The use of seed needs to be reduced, especially for farmers who still use seeds of more than 25 kg, or increase the area of the seedling area. Labor needs to be reduced or allocated effectively, where the division of tasks and working hours is clear so that it can be evaluated. Pesticides need to be reduced in use which must be right on target, right type, right time, right dose, and right method. The use of fertilizer inputs can be increased in order to achieve price efficiency.

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