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Enhancing Driver Factors of Rice Productivity and Farm Profitability

Nia Cahyati[1], Irmayani Noer[2], Henry Kurniawan[3]
Politeknik Negeri Lampung, Lampung, Indonesia[1,2,3,4]
Jl. Soekarno Hatta No.10, Rajabasa Raya, Kec. Rajabasa, Kota Bandar Lampung, Lampung 35141
Corresponding Author: niacahyati29@gmail.com
ORCID ID: 0009-0004-9641-4204

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ABSTRACT

The research aimed to analyze the external factors influencing the production and income of lowland rice farmers in South Lampung Regency, Lampung Province. Using both qualitative and quantitative methods, the study followed four stages: data collection, input, analysis, and interpretation. The research involved 50 farmers from the Sidomulyo District, with data gathered through questionnaires and interviews. The study identified key external factors affecting production, including land area (X1), seeds (X2), fertilizer (X3), pesticides (X4), and labor (X5). The production function was modeled as Ln Y = Ln 9.111 + 1.010 Ln X1 + 0.072 Ln X2 – 0.137 Ln X3 + 0.023 Ln X4 + 0.012 Ln X5, showing an increasing return to scale with a significance value > 0.05. This suggests that greater use of these production factors enhances rice production. The analysis revealed a good income of IDR 10,592,864.74, with R/C and B/C cash ratios exceeding 1, confirming that lowland rice farming in South Lampung Regency remains profitable. The study concludes that external factors significantly impact rice production and income, with potential for increased profitability through optimized resource use.

Keywords: Coub-Douglass; Farm Profitability; Farming Analysis; Production Factors; Rice Productivity

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INTRODUCTION

Lowland rice is a food commodity that is widely cultivated by farmers with a planting season twice a year. The problems faced in lowland rice farming are low production and production fluctuations which indicate production risks. Production risk can be caused by external factors that cannot be controlled by farmers as well as internal factors that can be controlled by farmers, such as management of input use (Armawan et al., 2023). External factors are usually difficult to predict, such as pest attacks and plant diseases, and unpredictable weather conditions (such as drought). Almost the entire South Lampung region requires increased water availability because water needs are very large while raw water supply is mainly needed for irrigation rice fields such as in Sidomulyo District and other districts (Rengganis, 2016).

Table 1. Land Area, Production, and Productivity of Paddy Fields in Lampung Province

Region	2022		
	Harvested Area (Ha)	Production (Tons)	Productivity (Ku/Ha)
West Lampung	13032.88	62802.09	48.19
Tanggamus	22563.40	128674.92	57.03
South Lampung	56393.41	339941.87	60.28
East Lampung	91718.06	449294.90	48.99
central Lampung	101612.69	566601.47	55.76
North Lampung	13705.47	63452.76	46.30
Right Way	21224.06	100985.27	47.58
Onion Bones	65510.84	268323.74	40.96
Pesawaran	23359.64	130558.89	55.89
Pringsewu	23489.05	137096.53	58.37
Mesuji	57654.90	296934.72	51.50
West Garlic Bones	10254.68	50700.33	49.44
West Coast	11921.43	60772.93	50.98
Bandar Lampung	491.63	2721.97	55.37
Metro	5323.92	29297.35	55.03
Lampung province	518256.06	2688159.74	51.87

Source: Central Agency of Statistics of Lampung Province (BPS Provinsi Lampung, 2023)

Based on the data in Table 1, the district/city with the highest lowland rice productivity in 2022 is South Lampung Regency. Meanwhile, the district/city with the lowest lowland rice productivity in the same period was Tulang Bawang. However, it is important to discuss whether income and factors that influence production are still significant in the farming process.

Farmers are the main actors in agricultural production activities and are part of Indonesian society whose welfare and intelligence need to be improved (Nurpalina et al., 2022). One of the efforts to increase intelligence is carried out through extension activities. Rice plants are planted by farmers to obtain maximum production results. This increase in production is inseparable from the efforts of all parties starting from farmers, farmer groups, and those related to agriculture. From the Regional Government in the form of program and budget policy support that aims to facilitate the agricultural sector (Handayani et al., 2019).

However, there are still many obstacles faced by farmers in efforts to increase lowland rice production, including farmers still not allocating production factors efficiently and effectively. Therefore, it is necessary to combine the use of production factors such as fertilizer, pesticides, seeds, and labor. According to Mubyarto (1989) production cannot

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be separated from the production factors owned by farmers to increase the production of their crops.

Based on the description above, the author is interested in conducting research in order to find out the true relationship between the characteristics and production of rice farmers and the factors that influence production and income from rice farming. This research aims to identify and analyze farmers' external factors that influence lowland rice production levels and income. Identify inputs and production factors that influence output and the efficiency of their use in lowland rice farming. The combination of these production factors has an impact on the results of cassava farming, and by using production factors with efficiency, farmers can achieve optimal results and increase their income. Production costs and income will be affected if farmers fail to manage all production factors optimally during the production process and do not know which factors have been used optimally. The problem discussed is how lowland rice production is influenced by the use of production factors such as land area, labor, fertilizer, seeds and pesticides, as well as how effective use of these production factors can be achieved by farmers in South Lampung Regency. There is no in-depth research and adequate information about lowland rice farming in South Lampung Regency, so this research was conducted.

LITERATURE REVIEW

Rice is a food plant in the form of clump grass originating from two continents, namely Asia and tropical and subtropical West Africa. Rice planting itself began in 3,000 BC in Zhejiang, China (Dewantoro, 2021). Almost half of the world's population, especially from developing countries, including Indonesia, mostly uses rice as a staple food consumed to meet their daily food needs. This makes rice plants have spiritual, cultural, economic, and political value for the Indonesian people because they can affect the lives of many people. Rice as a staple food can fulfill 56 – 80% of the calorie needs of the population in Indonesia (Noer & Unteawati, 2022).

The productivity of rice farming is influenced by various external factors, such as land area, seeds, fertilizers, pesticides, and labor. Previous studies have consistently shown that these factors are critical in determining agricultural output and efficiency. For instance, land area has been identified as a major determinant of production, with larger plots often correlating with higher yields (Wickramaarachchi & Weerahewa, 2018). The availability and quality of seeds have also been highlighted as crucial in maximizing crop potential, with better seed varieties contributing to increased production (Gupta, 2020).

Fertilizers and pesticides, while essential for enhancing crop growth and protection, present more complex relationships. Overuse or misuse of these inputs can lead to diminishing returns, as indicated by research showing a negative correlation between excessive application and crop yields (Gupta, 2020). The labor input, particularly in labor-intensive agricultural settings, remains a significant factor, where efficient use of labor can lead to improved productivity and profitability (Supartama et al., 2013).

Production function analysis is an analysis that explains the relationship between production and the production factors that influence it. The production function used to explain the parameters Y and X is the Cobb-Douglas function analysis.

The Cobb-Douglas production function can be formulated as follows:

$$Y = b_{0,}X1b1, X2b2,$$

Information:
Y = production
b_0= intercept
b_i= regression coefficient estimator variable-*i*
X_i= type of production factor i, where i =1,2,3…, n
e= natural number (e = 2.7182)
u= remaining elements (error)

The Cobb-Douglas production function is utilized in this research due to its strong theoretical foundation and practical advantages. It adheres to the Law of Diminishing Returns, ensuring that each additional input contributes to a greater marginal output. The estimated parameter (bi) in the Cobb-Douglas function directly represents the production elasticity of the corresponding input (Xi). This elasticity indicates the scale of returns: a bi value less than 1 suggests decreasing returns, a value equal to 1 indicates constant returns, and a value greater than 1 signifies increasing returns. The function's simplicity and ability to be easily converted into a linear form make it particularly useful for agricultural production analysis, as it also helps to minimize potential issues with heteroscedasticity. This combination of theoretical robustness and practical efficiency makes the Cobb-Douglas function a preferred tool in optimizing agricultural production processes.

To analyze the relationship between production factors and output, regression analysis using the Ordinary Least Squares (OLS) method is applied. According to Gujarati (1988), the OLS method is appropriate when certain assumptions are met: the residuals should be normally distributed, have a mean of zero, exhibit no serial correlation or autocorrelation, maintain homoscedasticity, and lack any perfect linear relationships between independent variables (no multicollinearity). Meeting these assumptions ensures the reliability and accuracy of the regression analysis, which is crucial for understanding how different factors influence agricultural productivity.

Regarding income and profits, Soekartawi (2016) provides relevant definitions. Cash income from agriculture is the monetary value derived from the sale of agricultural products, while cash expenditures cover the costs of goods and services purchased for agricultural purposes. Agricultural cash income includes the value of all products generated within a specific period, whether sold or unsold. Total agricultural income represents the comprehensive value of all inputs used in the production process, including calculated costs. Finally, total agricultural expenditure is the difference between gross agricultural income and total agricultural costs, reflecting the net financial outcome of farming activities. These concepts are essential for understanding the economic aspects of farming, especially when evaluating the profitability and sustainability of agricultural practices.

RESEARCH METHOD

Time and place

Data collection was carried out from August to December 2023, about one month after the rice harvest season at the research location. The location selection was carried out purposively, namely in Sidomulyo District.

Sampling

The data used in this research based on the collection method includes primary and secondary data (Kurniawan et al., 2024). Primary data was collected by conducting direct observations and interviews with respondent farmers by asking questions made in the form of a questionnaire that had been prepared previously.

Sidomulyo District was chosen deliberately as the location where the research was conducted with the consideration that this district is a district that produces lowland rice in South Lampung Regency. The research took place over a period of five months, namely August to December 2023. The population in this study were farmers who were owners of rice farming businesses in Sidomulyo, numbering 4,101 people. In order for the samples obtained to be representative, the number of samples was calculated using the Slovin method to obtain results from 50 farmers. Secondary data was obtained by searching the literature, books, research reports, articles, magazines, scientific works related to research problems, and via the internet. Apart from that, secondary data was also obtained from the Central Bureau of Statistics, Department of Agriculture, Food Crop Research Institute, Center for Agricultural Socioeconomic Research and Development, and Regional Government at the research location.

Data analysis

Data analysis was carried out qualitatively and quantitatively (Kurniawan et al., 2024). Qualitative analysis was used to find out the general description of rice farming and the relationship between farmer characteristics and rice farming production and income. Meanwhile, quantitative analysis was carried out to determine the factors that influence production and the level of efficiency of lowland rice farming using farming income analysis and production function analysis.

Farming income is the multiplication of the production obtained by the selling price. The greater the number of products or goods produced and the higher the price of the production unit concerned and related, the greater the total revenue received by the producer. On the other hand, if the product produced is small and the price is low, the total revenue received by the producer will be smaller. This statement can be seen as below:

$$Tr = Yi.Pyi$$

Information:
TR = Total Revenue
Yi = Production Obtained by Farming
Pyi = Price of Y

Total costs are the sum of fixed costs (Soekartawi, 2016), so they can be written using the formula below.

$$TC = TFC + TVC$$

Information:
TC = Total Cost
TFC = Total Fixed Costs (total fixed costs)
TVC = Total Variable Cost (total variable cost)

Revenue and cost balance analysis (R/C ratio analysis) is used as a tool to measure the feasibility criteria of the farming activities carried out. In this analysis, data on farming revenues and farming expenses are compared into one ratio. Analysis of the balance of revenues and costs is carried out based on the type of costs incurred, namely divided into R/C for cash costs and R/C for total costs.
Mathematically, the R/C ratio can be formulated in the following equation

$$R/C \text{ ratio} = \frac{TR}{TC}$$

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Information:
TR = Total Revenue (Total Revenue)
TC = Total Cost (Total Cost)

The total revenue or total costs from the results of the analysis can be seen from the amount of revenue that the farmer will get from every rupiah that will be spent by the farmer in the farming business with the R/C Ratio having the following provisions:
R/C / B/C > 1: Rice farming can be said to be profitable so that the farming is worthy of being a business.
R/C / B/C < 1: Then the rice farming is making a loss, so the rice farming is not suitable as a business.
R/C / B/C = 1: Rice farming business is equal, so the business has no profit and no loss.

Production Function Estimation
In the production function analysis, the Cobb-Douglas approach is used, namely:

$$Y = b_{0,}X1b1, X2b2, X3b3, X4b4,X5b5$$

Model function production is transformed into linear metal metric form for estimating the production function:

$$LnY = \ln b0 + b1 \ln X 1 + b2 \ln X 2 + b3 \ln X 3 + b4 \ln X4 + b5 \ln X5 + u\text{..................}$$

Information:
Y = Rice production yield (Kilograms)
X 1 = Land area (Ha)
X 2 = Seeds (Kilograms)
X 3 = Fertilizer (Kilograms)
X 4 = Pesticides (Liters)
X 5 = Labor (HOK)
b0 = Intercept variable
u = Error element
b1, b2, b3, b4, b5, b6, b7, b8 = regression coefficient of each variable

RESULTS

Income Analysis
The concept of cost is one of the most important things in management accounting and cost accounting. The aim of obtaining cost information is used for planning, controlling, and decision-making processes. Cost is the acquisition price that is sacrificed or used in order to obtain. The total revenue, profit, RC, BC, investment costs, and production costs which include cash costs and calculated costs will be analyzed.

Table 2. Analysis of Lowland Rice Farming on Average Per Planting Season

No	Description	Price (IDR)	Average Farming Effort/1 Planting Season		
			Unit	Amount	Value (IDR)
1.	Reception				
	Production	6,300	Kg	4911.20	30,940,560.00
2.	Investment costs				
	Gazebo hut				2,500,000.00
3.	Production cost				

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	I. Cash Costs				
	Seed	18,000	Kg	27.52	495,360.00
	Urea Fertilizer	2,600	Kg	665.42	1,730,092.00
	NPK Fertilizer	15,000	Kg	46.44	696,600.00
	SP36 Fertilizer	2,700	Kg	667.76	1,802,952.00
	Manure	100	Kg	1246.42	124,642.00
	Faxolone pesticide	550,000	lt	0.19	105,523.00
	Firta Pesticide	145,000	lt	1.25	181,549.28
	Sekor Fungicide Pesticide	190,000	lt	2.08	394,276.98
	Out-of-Family Kindergarten	40,000	IDR	120.00	4,800,000.00
	Tax	42,857	(IDR/year)	1	50,000.00
	Freight Costs	50,000	IDR	15.00	750,000.00
	Total Cash Costs				13,630,995.26
	II. Costs are taken into account				
	Kindergarten in the Family	40,000	IDR	37.00	1,480,000.00
	Land lease		IDR		5,000,000.00
	Tool Depreciation		IDR		236700.00
	Total Cost is calculated				6,716,700.00
4.	Total cost				20,347,695.26
5.	Income				
	I. Income from Cash Fees				17,309,564.74
6.	R/C Ratio				
	I. R/C Ratio of Cash Costs				2.27
	II. R/C Ratio Over Total Costs				1.52
7.	B/C Ratio				
	I. B/C Ratio of cash costs				1.27
	II. B/C Ratio of total costs				0.52

Source: Data Processing (2024)

Based on Table 2, it can be explained that farming income is the multiplication of the production obtained by the selling price. The income is also determined by the size of the production produced and the price of that production. The average amount of production harvested in one planting season is 4911.20 kg. with an average selling price for lowland rice of IDR 6300/kg. The average total income of farmers in lowland rice farming is IDR 30,940,560.00 Farming income by respondents from lowland rice farming can still be increased further. This is closely related to rice production and the selling price that respondent farmers receive. Rice production can be increased by using inputs according to the recommended dosage so that lowland rice production can increase. The majority of farmers in South Lampung Regency own land with self-owned status and rent/share the results. The total costs incurred in rice farming are IDR 20,347,695.26 with cash costs of IDR 13,630,995.26 and costs are calculated at IDR 6,716,700.00 so that rice farming in Sidomulyo gets income from cash costs of IDR 17,309,564.74 and income from total costs of IDR 10,592,864.74.

The R/C ratio value for cash costs is 2.27, which means that IDR 1 cash cost incurred by farmers will generate income of IDR 2.27. If you include the calculated costs in the total cost component, the R/C ratio value becomes 1.52, which means that for every IDR. 1 of costs incurred, you will receive IDR 1.52 in revenue. The value of the B/C Ratio in lowland rice farming for cash costs is 1.27, which means that every IDR 1 spent on production costs produces a profit or income of IDR 1.27 and for total costs of 0.52, which means that every IDR 1 spent for production costs, it produces a profit or income of IDR 0.52. The cash R/C and B/C ratio values that are more than one indicate that lowland rice farming in Sidomulyo District, South Lampung Regency is still profitable, while the

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total R/C and B/C ratio values are not profitable because they are less than 1. So, it can be seen that farming This lowland rice is still profitable for farmers in Sidomulyo District, South Lampung Regency.

Production Analysis
The influence of production factors using the Cobb-Douglas production function model. The production function is a physical relationship between the variable that is explained (Y) and the variable that explains (X), the variable that is explained is usually in the form of output and the variable that explains is in the form of input (Soekartawi, 2016). To find out which factors have a real influence on production, the Coub-Douglass production function is used using a multiple regression analysis tool with the help of a quantitative data analysis tool with the following equation:

LnY = In b0 + b1 In X 1 + b2 In X 2 + b3 In X 3 + b4 InX4+ b5 In X5+ u……………..…….(1)

So that the production function can be estimated using the quadratic method, it needs to be transformed into linear form as follows:

Ln Y = Ln 9.111 + 1.010 Ln X1 + 0.072 Ln X2 – 0.137 Ln X3 + 0.023 Lneu
Ln Y = Ln 9.111 + 1.010 Ln X1 + 0.072 Ln X2 – 0.137 Ln X3 + 0.023 Lneu= 10.091

Information:
Y = Rice production yield (Kilograms)
X 1 = Land area (Ha)
X 2 = Seeds (Kilograms)
X 3 = Fertilizer (Kilograms)
X 4 = Pesticides (Liters)
X 5 = Labor (HOK)
b0 = Intercept variable
u = Error element
b1, b2, b3, b4, b5 = regression coefficient for each variable

Noer (2002) states that to test whether the economic scale of the business is in a condition of increasing, constant, or decreasing returns to scale, an economic analysis of the business scale is carried out, by adding up the estimated parameter values, where the total parameter value is 10.091 (meaning > 1). Fixed and variable input parameter values greater than one indicate Increasing return to scale. Returns to scale increase increasing returns to scale, namely a condition where the doubling scale of input results in a change in the scale of doubling output that is greater. So, every addition of production factors in the production process causes an increasing increase in output. In this phase, the production elasticity is more than one.

Table 3. Kolmogorov-Smirnov Test Results for Lowland Rice Farming

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residuals
N		50
Normal Parameters, b	Mean	0.0000000
	Std. Deviation	0.04099663
Most Extreme Differences	Absolute	0.081
	Positive	0.081
	Negative	-0.041
Statistical Tests		0.081
Asymp. Sig. (2-tailed) c		0.200d

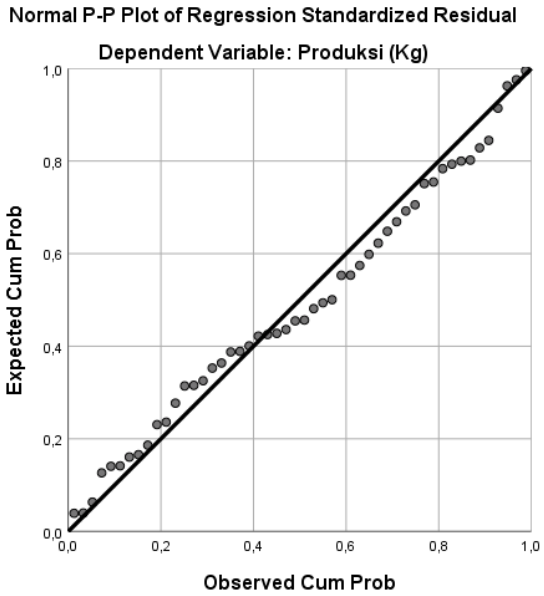
Monte Carlo Sig. (2-tailed) e	Sig.		0.561
	99% Confidence Interval	Lower Bound	0.548
		Upper Bound	0.573

Source: Primary Data, Processed (2024)

The Normality test is carried out using the One-Sample Kolmogorov-Smirnov test. Seen from the sig value, if it is greater than 0.05, it can be concluded that the data is normally distributed, whereas if it is smaller than 0.05 then the data is not normally distributed (Handayani et al., 2022). Testing whether the data is normally distributed or not can be seen in the Kolmogorov-Smirnov test results table for lowland rice farming. Table 3 shows that testing normality and using the Kolmogorov Smirnov Test and getting an Asymp. Sig value of 0.200 (meaning > 0.05) can be concluded that the data is normally distributed. The results of the Sidomulyo sub-district normality test can be seen in Table 3.

The Normality Test can also be carried out using the Normal P-Plot graph as in Figure 1.

Figure 1. Normal P-Plot of Regression Standardized Residual Graph



The multicollinearity test is by looking at the Tolerance and Inflation Factor (VIF) values in the regression model. If the VIF value is less than 10 and the Tolerance value is more than 0.1 then it can be concluded that a regression model is free from multicollinearity.

Table 4. Multicollinearity Test Results

Variable	Tolerance	VIF	Information
Land area	0.289	3.455	Multicollinearity does not occur
Seed	0.427	2.342	Multicollinearity does not occur
Fertilizer	0.481	2.080	Multicollinearity does not occur
Pesticide	0.347	2.878	Multicollinearity does not occur
Labor	0.497	2.012	Multicollinearity does not occur

Source: Primary Data, Processed (2024)

Based on the output coefficients in Table 4, it can be seen in the VIF column that the VIF value for land area, seeds, fertilizer, pesticides, and labor is <10 and Tolerance is >0.1, so it can be said that the regression model does not have multicollinearity.

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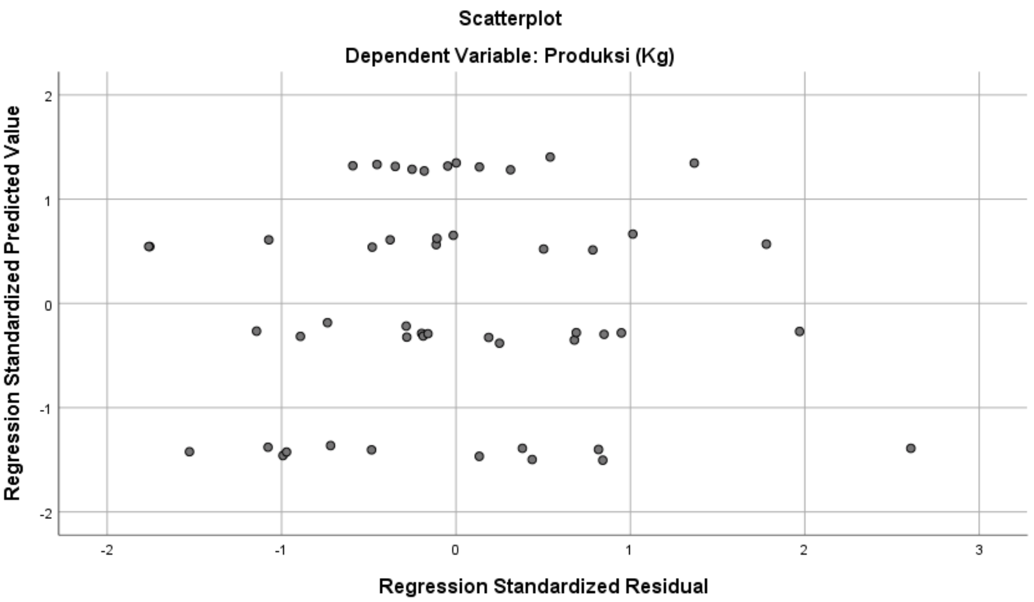
To analyze whether there is heteroscedasticity, it can be seen in the scatterplot graph in Figure 2.

Figure 2. Heteroscedasticity Test Results



The results of the heteroscedasticity test show that the plotting points are spread above and below or around the number 0, the plotting points do not gather together and do not form a particular pattern. So, it can be concluded that there is no heteroscedasticity in the data.

The statistical test aims to see the influence of the independent variable on the dependent variable (Kurniawan, 2013), namely lowland rice production in Candipuro District, South Lampung Regency. Table 5 is the coefficients table. This table functions to create a regression equation and see the significant influence of production factor variables and production efficiency.

Table 5. Variable Regression Analysis Results

Variable	Regression	Significance	VIF	T count
Constant	9.111	0.000		32.007
Land area (X1)	1.010	0.000	3.455	23.071
Seed (X2)	0.072	0.003	2.342	3.217
Fertilizer (X3)	-0.137	0.001	2.080	-3.729
Pesticides (X4)	0.023	0.267*	2.878	1.125
Labor (X5)	0.012	0.493*	2.012	0.692
R^2 = 0.999				
Durbin Watson = 1.362				
F Calculate = 6698.110				
F Table = 2.45				
T Table = 2.014				
Confidence level = 95%				
= real α 5%				
* = not significant				

Source: Primary Data (2024)

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In Table 5, the results of the regression analysis show the valuesR^2 is 0.999 or reaches 99.9%. This shows that the influence of the independent variables land area, seeds, fertilizer, pesticides, labor, age, education level, length of farming, and training on lowland rice production is 99.9%. The independent variable used in the model is able to explain 99.9% of the dependent variable. Meanwhile, the remaining 0.1% is influenced by other variables outside this research model.

Based on the results of the F test carried out through data processing using quantitative analysis tools, it can be seen in Table 5 that the calculated F value is 6698.110. Meanwhile, in the F table, F table = 2.45. So, F count 6698.110 > F table 2.45. It can be concluded that simultaneously the independent variables (X), including land area, seeds, fertilizer, pesticides, and land area, have an effect on the dependent variable, namely lowland rice production (Y). So, in other words, the independent variables are able to explain the magnitude of the dependent variable for lowland rice production or that all independent variables have a simultaneous effect on lowland rice production.

DISCUSSION

The results of the analysis show that rice farming in South Lampung Regency has a good income of IDR 10,592,864.74, with an R/C value and B/C cash ratio of more than 1. This indicates that rice farming in the area remains profitable.

The analysis of external factors influencing farmer production highlights the significant roles played by land area (X1), seeds (X2), fertilizer (X3), pesticides (X4), and labor (X5) in rice farming within South Lampung Regency. The production function equation obtained, Ln Y=Ln 9.111 + 1.010 Ln X1 + 0.072 Ln X2 – 0.137 Ln X3 + 0.023 Ln X4 + 0.162 Ln X5, suggests that fixed and variable input parameters with values greater than 1 indicate an increasing return to scale. This implies that enhancing the use of these external production factors can lead to greater overall production efficiency, as evidenced by the significant value greater than 0.05, which supports the idea that external factors have a considerable impact on lowland rice production.

To further understand these findings, a comparison with existing studies that have explored profitability and production efficiency in rice farming across different regions is essential. Wickramaarachchi and Weerahewa (2018) provide valuable insights, demonstrating a positive correlation between land area and increased production yields in various agricultural contexts. This reinforces the finding that land area (X1) is crucial for boosting production. Additionally, the negative relationship observed between the use of fertilizers and pesticides and the production function aligns with the results of Gupta (2020), who found similar trends. These findings suggest that while fertilizers and pesticides are necessary, their overuse or inappropriate application can diminish production efficiency.

By situating these results within the broader literature, this research not only offers a detailed analysis of rice production optimization but also provides critical insights into the agricultural policy implications for South Lampung and similar regions. These comparisons highlight potential strategies for improving efficiency and profitability, particularly through the judicious use of resources. This comprehensive understanding can guide policymakers and practitioners in making informed decisions that enhance the sustainability and productivity of rice farming.

CONCLUSION

The research aimed to analyze the income levels and the effective use of production factors among lowland rice farmers in South Lampung Regency, Lampung Province. The findings reveal that rice farming in the region is profitable, with an average income of IDR 10,592,864.74 and an R/C value and B/C cash ratio exceeding 1. This profitability indicates that rice farming remains a viable economic activity in the area.

Moreover, the study underscores the significant influence of external factors such as land area, seeds, fertilizer, pesticides, and labor on rice production. The production function equation, Ln Y=Ln 9.111 + 1.010 Ln X1 + 0.072 Ln X2 – 0.137 Ln X3 + 0.023 Ln X4 + 0.162 Ln X5, shows that certain input parameters exhibit values greater than 1, suggesting an increasing return to scale. This implies that enhancing the use of these external factors can lead to improved production efficiency. The results further emphasize that these factors play a crucial role in optimizing rice production in the region, with the potential to inform agricultural policies aimed at sustaining and improving rice farming profitability.

The Ministry of Agriculture and the South Lampung Regency Agricultural Service are expected to be able to provide training, especially to young farmers, so that they meet expectations and are able to apply their knowledge well, direction, and facilities to farmers through agricultural instructors and efforts to improve technology, skills, and knowledge of farmers in recommending the use of factors. good and correct production and farming.

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The authors declared no potential conflicts of interest.

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