

Analysis Of Production Efficiency In Large Red Chili Farming In Kampili Village, Pallangga Subdistrict, Gowa Regency

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Abstract

This study aims to analyze the factors influencing large red chili pepper production and estimate the efficiency level of large red chili pepper farming in Kampili Village, Pallangga District, Gowa Regency. The sampling method used was 30 large red chili farmers. The sample size used in the study was 30 people, or 15% of the total population of large red chili farmers. The results of the regression analysis showed that not all input variables significantly influenced production (Y). The variables seed (X₂), urea fertilizer (X₃), and NPK Phonska fertilizer (X₄) had a positive and significant effect on production, as their significance values were less than 0.05. Meanwhile, the variables land area (X₁), petroganic organic fertilizer (X₅), demolish pesticide (X₆), and labor (X₇) did not have a significant effect, having a significance value greater than 0.05. Nevertheless, all regression coefficients were positive, indicating that all input variables tended to increase large red chili production. Meanwhile, input efficiency indicates that most production factors are not being utilized optimally. The variables land area (X₁), seeds (X₂), urea fertilizer (X₃), Phonska NPK fertilizer (X₄), Petroganic organic fertilizer (X₅), and Demolish pesticide (X₆) are inefficient, requiring increased utilization to achieve maximum production. Labor (X₇) is inefficient, with an economic efficiency value of less than one, requiring reduction or more efficient management. Overall, large red chili farming still has opportunities to increase production and income through optimizing the use of production inputs, particularly land area, seeds, fertilizer, pesticides, and controlling labor costs.

Keywords: Large Red Chili Peppers, Production Efficiency, Production Factors

INTRODUCTION

The large chili pepper is a shrub belonging to the nightshade family. Chili peppers originated in the Americas, specifically in Peru, and have spread to countries across the Americas, Europe, and Asia, including Indonesia. The large red chili pepper belongs to the Solanaceae family and grows as a shrub. This plant is classified as a short-lived crop (Afrina et al., 2018). Large red chili peppers serve as a spice for cooking or are used as an ingredient in food and beverages on an industrial scale, and they play a role in the production of medicines and beauty products (Afrina et al., 2018). Although large red chili peppers are easy to cultivate, it is crucial to ensure the necessary conditions for optimal and vigorous growth (Purnomo et al., 2018).

Large red chili peppers often face numerous challenges in increasing their harvest productivity. One of the most significant issues is the presence of pests and diseases that can cause substantial losses in the agricultural sector. The more types of pests or diseases that attack, the greater the damage inflicted on the plants (Effendi et al., 2019). Large red chili peppers are one of the most important crops for the Indonesian people. The red chili pepper commodity makes a significant contribution to the national economy, yet production levels and prices often experience sharp fluctuations (Sukiyono & Janah 2019).

Large red chili peppers are a very important commodity in Kampili Village, located in Palangga Subdistrict. In this area, many red chili peppers are grown in lowland areas that serve as the center of large red chili pepper production. Based on information obtained from an initial survey, large red chili farmers in the study area face various challenges directly related to agricultural production efficiency. These challenges include the suboptimal use of production factors, such as land size, seeds, fertilizers, pesticides, and labor. Some of them still rely on production inputs following inherited traditions, rather than carefully assessing the plants' exact needs. This situation results in the sometimes excessive use of inputs, yet at the same time fails to boost production yields optimally. Additionally, large red chili farmers in Kampili Village, Pallangga Subdistrict, Gowa Regency, also face challenges such as high prices for production inputs, limited capital, pest and disease attacks on crops, and price fluctuations for large red chili in the market. Rising production costs that are not matched by an increase in crop yields can reduce farmers' profits. Therefore, an analysis of the use of production inputs is essential to determine whether the production factors being used have reached an efficient level or not. Another problem faced by farmers is a lack of knowledge regarding how to properly combine production inputs. For example, applying fertilizers and pesticides at incorrect doses can lead to increased production costs and even a decline in crop quality. Similarly, unplanned labor use can result in wasted costs. In

agricultural practice, production efficiency is crucial because farmers are required to produce high volumes while maintaining a balance between costs and input usage.

In 2020, the harvested area reached 6 hectares with a total yield of 228 tons. However, in 2021, the harvested area decreased to approximately 4 hectares, and the yield dropped to 65 tons. Furthermore, in 2022, the harvested area decreased again to about 3 hectares with a yield of 55 tons. In 2023, there was a sharp decline with only 1 hectare of harvested area and a yield of 25 tons. In contrast, in 2024 there was an increase with the harvested area reaching 4 hectares and total production of 70 tons. Available data indicates that chili pepper production in Gowa Regency increased in 2020 to 228 tons, but from 2021 to 2023, production decreased by 25 tons. Pallangga Subdistrict is one of the areas in Gowa Regency actively engaged in red chili pepper cultivation. This subdistrict consists of several villages, and one of them, Kampili Village, is an area where the majority of the residents are vegetable farmers. Research shows that low yields in crops such as chili peppers are often caused by extreme weather conditions, which can damage the plants and significantly reduce yields (Kusno et al., 2020). In addition, variations in crop yields can be influenced by spatial and temporal factors, indicating that an understanding of these dynamics is crucial for efficient yield forecasting and management (Assefa, 2013). Statistical models, including time-series analysis, have been applied to forecast crop yields by taking environmental variables into account, which is essential for addressing the complexities of agricultural production (Dharmaraja et al., 2020). The changes observed in chili pepper production in Gowa Regency highlight the need for adaptive strategies in agricultural practices to mitigate risks associated with yield variability and environmental changes (Ramirez et al., 2003).

Based on the background and issues described above, the objective of this study is to analyze the factors influencing agricultural production and to estimate the level of efficiency in the cultivation of large red chili peppers in Kampili Village, Pallangga Subdistrict, Gowa Regency.

THEORETICAL REVIEW

An analysis of efficiency in the cultivation of large red chili peppers provides important insights into the factors that influence productivity and efficiency in the agricultural sector. Research shows that although there has been an increase in the productivity of large red chili peppers, farmers often lack the necessary financial management skills, which can hinder overall efficiency (Agi Dahtiar 2025). The technical efficiency (TE) ratio for red chili cultivation varies, with a reported average of 0.83 when risk is not taken into account and 0.82 when risk is factored in, indicating that the majority of farmers (more than 68%) operate efficiently (Saptana et al. 2016). Furthermore, the use of appropriate inputs, such as

specific land areas and types of fertilizer, is crucial for maximizing yields, especially in challenging locations such as sandy coastal soils (Fivintari & Shofiyah 2024). In areas such as Sawang District, factors such as labor availability and fertilizer use have a significant impact on crop yields, with a technical efficiency of 0.796, indicating opportunities to improve practices in order to achieve higher yields (Adhiana et al., 2022).

Efficiency, as a performance metric, theoretically underpins a company's overall performance. Efficiency is a crucial concept for assessing the economic performance of a production process (Raihan Hanafi 2017). Production efficiency can be measured by comparing the inputs used and the outputs produced. When a production process is more efficient, productivity also increases (Priyastuti, 2021). To measure the efficiency of production factor utilization in large red chili farming, it can be said that efficiency has been achieved if input costs can be minimized. According to the opinion of Puryanto & Wardiyanto, (2022) explains that efficiency can be achieved if the value of marginal product (NPM) of each input is equal to its price (P_x).

Framework Conceptual

Based on the literature review above, the author outlines the conceptual framework of this study as follows:

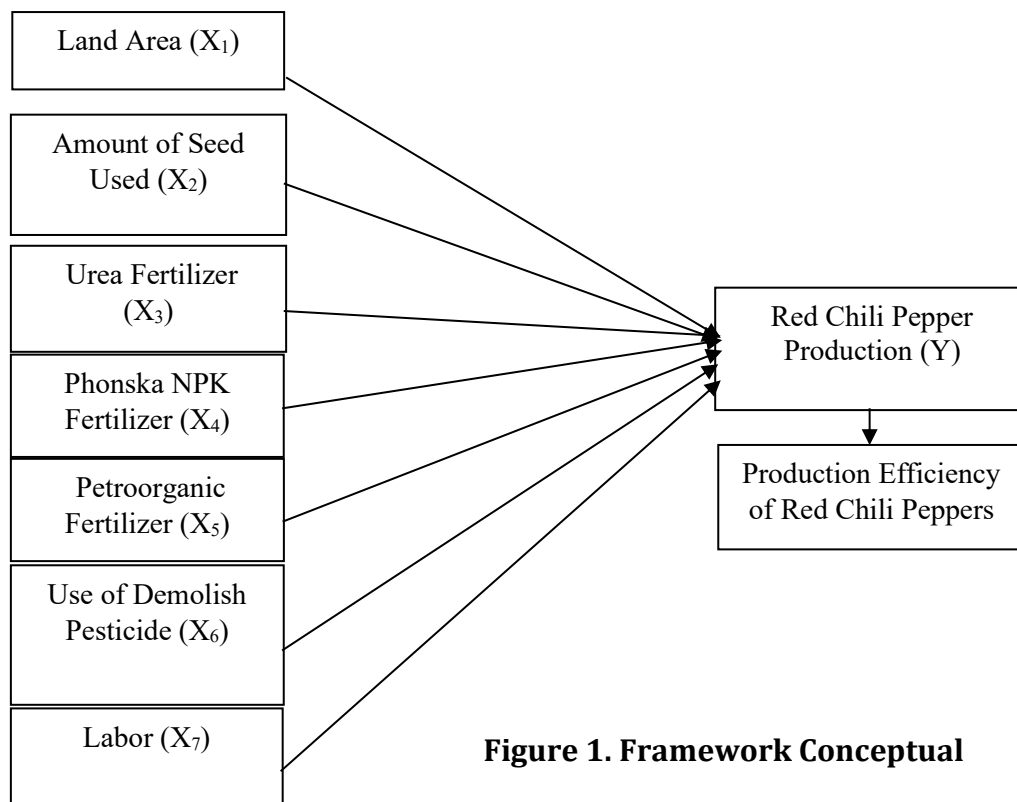


Figure 1. Framework Conceptual

Hypothesis

In this study, the hypothesis proposed is:

1. It is suspected that the production factors of land area, seeds, urea fertilizer, phonska NPK fertilizer, petroorganik organic fertilizer, Demolish pesticide, and labor have a partially positive effect on red chili pepper production in Kampili Village, Palangga Subdistrict, Gowa Regency.
2. It is suspected that the production factors of land area, seeds, urea fertilizer, phonska NPK fertilizer, petroorganik organic fertilizer, Demolish pesticide, and labor collectively influence the production of red chili farming in Kampili Village, Palangga Subdistrict, Gowa Regency.
3. Estimated value $NPM_{xi}/P_{xi} > 1$ This means that the use of production inputs such as cultivated land, seeds, urea fertilizer, phonska NPK fertilizer, petroorganik organic fertilizer, demolish pesticide, and labor is not yet efficient, and the use of these production inputs needs to be increased.
4. Estimated value $NPM_{xi}/P_{xi} < 1$ refers to the use of production inputs such as cultivated land area, seeds, urea fertilizer, phonska NPK fertilizer, organic and petro-organic fertilizers, and pesticides demolish and labor is inefficient, and it is necessary to reduce the use of those production inputs.

METHOD

In this study, the population consisted of 140 farmers who cultivate large red chili peppers. Based on this information, the researchers selected 15% of the total population as the study sample, comprising 30 large red chili pepper farmers. The sampling method used was random, in which the sample was selected using simple random sampling from the entire population without considering stratification within the overall population. The data analysis techniques applied in this study are as follows:

1. Multiple Linear Regression Analysis

Mathematical analysis using the cobb-douglas production function model (Marni et.,al 2002) is:

$$Y = aX_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} X_4^{\beta_4} X_5^{\beta_5} X_6^{\beta_6} X_7^{\beta_7} e^i$$

The cobb-douglass function was transformed into logarithmic form to obtain a linear equation. After converting it to the Ln form, the following multiple linear regression equation was obtained:

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + u$$

The expected estimated parameter value is:

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7 > 0$$

Where:

$\ln Y$ = Production of Large Red Chili Peppers (Kg)

β_0 = Constant

$\beta_1 \dots \beta_7$ = Regression Coefficients for Each Independent Variable $X_1 \dots X_7$

X_1 = Land (Ha)

X_2 = Amount of Seed Used (Gram)

X_3 = Amount of Urea Fertilizer Used (Kg)

X_4 = Amount of Phonska NPK Fertilizer Used (Kg)

X_5 = Amount of Organic Fertilizer Used (Kg)

X_6 = Amount of Pesticide Use (Liter)

X_7 = Number of Labor (HOK)

u = Standard Error

2. Analysis of the Efficiency of Large Red Chili Farming

a). Economic Efficiency

The economic efficiency of a factor of production is determined by calculating the ratio of the marginal product of an input X_i to the price of that input. Mathematically, this is expressed as follows:

$$EE = \frac{NPM_{xi}}{P_x}$$

Where:

EE (Economic Efficiency) = The efficiency value of the use of production factor (i).

NPM_{xi} (Marginal Product Value of Production Factor X) = The additional value of production (revenue) obtained from adding one unit of production factor (i).

P_x = input price (the cost or price per unit of the production factor (input i) used).

b). Allocative Efficiency or Price Efficiency

Price efficiency describes the relationship between costs and output. Price efficiency is achieved when a firm is able to maximize profits by equating the Marginal Product Value (MPV) of each factor of production with its price. The formula for price (allocative) efficiency is as follows:

$$\frac{b. Y. P_y}{X. P_y} = 1$$

Where:

b = Production elasticity

X = Production volume X

Y = Factors of production

Px = Prices of production factors X

Py = Production cost

Once the NPM results for each factor of production have been obtained, the average price efficiency will be calculated using the following formula:

$$EA = \frac{NPM_1 + NPM_2 + NPM_3 + NPM_4 + NPM_5 + NPM_6 + NPM_7}{7}$$

Where :

NPM₁ = NPM Land

NPM₂ = NPM Seeds

NPM₃ = NPM Fertilizer Used

NPM₄ = NPM Phonska NPK Fertilizer Used

NPM₅ = NPM Organic Fertilizer Used

NPM₆ = NPM Pesticide Use

NPM₇ = NPM Labor

According to (Soekartawi et al., 2011) in reality, NPM_x is not always equal to P_x; what often happens is as follows:

- (NPM_x / P_x) > 1 This means that the use of input X is not yet efficient; to achieve efficiency, input X needs to be increased.
- (NPM_x / P_x) = 1 This means that the use of input X is already efficient.
- (NPM_x / P_x) < 1 This means that the use of input X is inefficient; to become efficient, the use of input X needs to be reduced.

RESULTS AND DISCUSSION

Analysis of the Influence of Production Factors on Large Red Chili Farming

Analysis of the impact of agricultural production factors is a study aimed at determining the extent to which the use of production inputs affects agricultural output. In agricultural activities, farmers use various production factors such as land area, seeds, urea fertilizer, phonska npk fertilizer, organic and petro-organic fertilizers, demolish pesticides, and labor. According to the opinion of (Walter & Snyder 2012) states that production

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transforms inputs into outputs. The yield of large red chili peppers depends on the production factors used during cultivation; using optimal inputs increases yields. Efficiency in the agricultural sector is influenced by farm size, extension support, access to credit, and farmer education. Production yields are influenced by farmers' decision-making skills regarding production (Ruzhani & Mushunje 2025). In addition, OECD (2025) states that progress in agricultural production stems from the efficient combination of production factors, not merely from increased inputs such as land. The focus should be on input management, agricultural technology, and resource efficiency. Based on the primary data obtained, the data was tabulated and analyzed using SPSS 25, yielding the coefficients for each independent variable, as shown in Table 1.

Table 1. Results of the Cobb-Douglas Function Analysis

Variabel	Koefisien Regresi	t _{hitung}	t _{tabel}	Signifikansi
Constant	5,381	5.477	2.045	0.000
Land Area (X ₁)	0.168	1.282	2.045	0.213
Seeds (X ₂)	0.488	2.879	2.045	0.009
Urea Fertilizer (X ₃)	0.264	3.506	2.045	0.002
Phonska NPK Fertilizer (X ₄)	0.344	3.131	2.045	0.005
Organic Fertilizer Petroorganik (X ₅)	0.108	1.143	2.045	0.265
Demolish Pesticide (X ₆)	0.109	1.233	2.045	0.231
Labor (X ₇)	0.056	0.699	2.045	0.213
F _{hitung}	94.824			0,000
R	0.984			
R ²	0.968			

Source: Processed Primary Data, 2026

Table 1 above shows that the regression coefficients in the cobb-douglas production function also represent the elasticity values of each variable. The research model using ordinary least squares can be expressed by the following equation:

$$\begin{aligned}\text{LnY} &= \text{Ln } \beta_0 + \beta_1 \text{LnX}_1 + \beta_2 \text{LnX}_2 + \beta_3 \text{LnX}_3 + \beta_4 \text{LnX}_4 + \beta_5 \text{LnX}_5 + \beta_6 \text{LnX}_6 + u \\ \text{LnY} &= \text{Ln } 5,381 + 0,168 \text{LnX}_1 + 0,488 \text{LnX}_2 + 0,264 \text{LnX}_3 + 0,344 \text{LnX}_4 + \\ &\quad 0,108 \text{LnX}_5 + 0,109 \text{LnX}_6 + 0,056 \text{LnX}_7\end{aligned}$$

The cobb-douglas function equation is derived through a transformation of the previously formulated regression equation. Since the regression equation is still in natural logarithmic form (ln), it can be mathematically expressed as follows:

$$\text{LnY} = 5.381 X_1^{0.168} X_2^{0.488} X_3^{0.264} X_4^{0.344} X_5^{0.108} X_6^{0.109} X_7^{0.056}$$

Table 1 shows the coefficient of determination (R^2) which indicates the extent to which the independent variables contribute to the dependent variable. A coefficient of determination (R^2) value of 0.968 indicates that the variables of land area, seeds, urea fertilizer, NPK Phonska fertilizer, petro-organic fertilizer, dolomite pesticide, and labor collectively account for 98.8% of the variation in curly red chili production, while 3.2% is attributed to other factors outside the scope of this study, such as climate, farm management, and so on. Additionally, the calculated F-value is 94.824, which is greater than the critical F-value of 2.045, meaning that land area, seeds, urea fertilizer, NPK Phonska fertilizer, petro-organic fertilizer, dolomite pesticide, and labor collectively influence the production of large red chili peppers in Kampili Village, Pallangga Subdistrict, Gowa Regency.

1. The Effect of Land Area (X_1) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X1 (land area) has a regression coefficient of 0.168, a calculated t-value of 1.282, and a significance value of 0.213. Since the significance value of $0.213 > 0.05$, Ln_X1 does not have a significant effect on Y. This means that an increase in Ln_X1 does tend to increase Y, but this effect has not been statistically proven based on the sample data used. Thus, changes in Ln_X1 cannot yet be considered a primary factor in explaining changes in the Y variable. The insignificant effect of land area on large red chili production indicates that even if land area is increased, without appropriate intensification of input use (fertilizer/pesticides), production yields will not increase significantly. Many farmers cultivate land on a small and consistent scale, so land area is not the primary constraint on production. This is consistent with a survey conducted by Andayani, (2016) states that the land factor does not have a significant partial effect on red chili pepper

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production. Another study suggests that Katarina, (2018) stated that the variable of land area has no effect on the production of red chili peppers. The reason is that farmers who grow red chili peppers have relatively similar land areas (small plots ranging from 9 to 25 ares).

2. Seeds (X_2) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_2 has a regression coefficient of 0.488, a calculated t-value of 2.879, and a significance level of 0.009. Since the significance value of 0.009 is less than 0.05, Ln_X_2 has a positive and significant effect on Y . This means that if Ln_X_2 increases by one unit, Y will increase by 0.488 units, assuming all other variables remain constant. Thus, changes in Ln_X_2 play a significant role in increasing the Y variable. This is consistent with the findings of a study by Setyadi, (2020) states that seed production factors have a significant partial effect on chili pepper production. Increasing the number of seedlings will contribute to higher yields of curly chili peppers, provided that the quality of the seedlings is guaranteed. Good, high-quality seedlings are better able to withstand various environmental conditions, thereby increasing crop yields. This aligns with the statement by Karyani, (2021), who noted that seeds play a crucial role in determining the production of high-quality crops. Furthermore Afif et al., (2020) state that increasing the number of seedlings will boost curly chili production, provided the quality of the seedlings is good. Superior seeds and seedlings are more tolerant of environmental conditions, thereby increasing production.

3. Urea Fertilizer (X_3) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_3 has a regression coefficient of 0.264, a calculated t-value of 3.506, and a significance level of 0.002. Since the significance level of 0.002 is less than 0.05, Ln_X_3 has a positive and significant effect on Y . This means that an increase in Ln_X_3 will be followed by a significant increase in Y . The regression coefficient of 0.264 indicates that every one-unit increase in Ln_X_3 will increase Y by 0.264 units, assuming all other independent variables remain constant. Thus, Ln_X_3 is one of the factors that significantly influences the increase in Y . This is consistent with the findings of Rajudinnor, (2018) and Afif et al., (2020) significant partial effect on red chili production. The reason is that urea plays a crucial role in stimulating vegetative growth, producing new shoots, and promoting leaf greenness, with an optimal dose of approximately 150–200 kg per hectare.

4. Phonska NPK Fertilizer (X_4) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_4 has a regression coefficient of 0.344, a calculated t-value of 3.131, and a significance level of 0.005. Since the significance level of 0.005 is less than 0.05, Ln_X_4 has a positive and significant effect on Y. This means that as Ln_X_4 increases, Y also tends to increase significantly. A regression coefficient of 0.344 indicates that a one-unit increase in Ln_X_4 will increase Y by 0.344 units, assuming all other variables remain constant. The beta value of 0.391 also indicates that Ln_X_4 has a fairly strong influence on Y after Ln_X_2 . Based on various research findings, the use of Phonska NPK fertilizer does indeed have a significant partial effect on the production of large red chili peppers, particularly in enhancing vegetative and generative growth. This fertilizer contains a balanced mix of Nitrogen (N), Phosphorus (P), Potassium (K), and Sulfur (S), which are crucial for the fruit formation phase. This aligns with the findings of Josina, (2017) , who stated that the NPK Phonska fertilizer production factor has a significant partial effect on red chili production.

5. Petroorganik Organic Fertilizer (X_5) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_5 has a regression coefficient of 0.108, a calculated t-value of 1.143, and a significance value of 0.265. Since the significance value of $0.265 > 0.05$, Ln_X_5 does not have a significant effect on Y. This means that although the regression coefficient is positive, the effect of Ln_X_5 on Y has not been statistically proven. Thus, an increase in Ln_X_5 does not necessarily result in a noticeable change in Y in this research model. The addition of organic fertilizer did not have a significant impact at the study site because the method of applying the organic fertilizer did not align with recommendations from local extension officers. The organic fertilizer used had poor maturity quality it was not fully decomposed and was characterized by a dark black color, was not sticky, and had a crumbly texture. As a result of this mixture, after irrigation, the soil becomes moist, which triggers a proliferation of root aphids. Consequently, the use of organic fertilizer may actually reduce red chili pepper yields. This typically occurs because farmers have not optimized the dosage, or the use of organic fertilizer does not immediately and directly impact harvest yields. This aligns with a study by Adhiana, (2021) states that the use of organic fertilizer does not have a significant effect on red chili pepper production. The use of organic fertilizer can improve the physical, chemical, and biological properties of the soil, thereby ensuring the sustainability of agriculture (Subaedah 2018).

6. Demolish Pesticide (X_6) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_6 has a regression coefficient of 0.109, a calculated t-value of 1.233, and a significance value of 0.231. Since the significance value of $0.231 > 0.05$, Ln_X_6 does not have a significant effect on Y. This means that the effect of Ln_X_6 on Y is positive but not statistically strong enough. This indicates that changes in Ln_X_6 are not yet capable of explaining changes in Y in a meaningful way. This suggests that increasing the dose of this pesticide does not directly increase crop yield. Based on the research results, the use of Demolish pesticide was indeed found to have no significant effect on the production of large red chili peppers. The regression coefficients indicate that increasing or decreasing the dose of this pesticide does not directly result in a significant increase in crop yield. This is consistent with the findings of Munita et., al , (2020), who reported that the production factors of fertilizer and pesticide application do not have a significant effect on red chili pepper production

7. Labor (X_7) Regarding the Production of Large Red Chili Peppers (Y)

The variable Ln_X_7 has a regression coefficient of 0.056, a calculated t-value of 0.699, and a significance value of 0.492. Since the significance value of $0.492 > 0.05$, Ln_X_7 does not have a significant effect on Y. The regression coefficient of 0.056 indicates that the effect of Ln_X_7 on Y is very small. This suggests that changes in Ln_X_7 do not yet explain changes in Y in a meaningful way. The research results show that labor often does not have a significant effect on the production of large red chili peppers, especially in partial analysis. Even if the number of workers is increased, this does not necessarily boost the harvest yield significantly. Labor is often not utilized efficiently or is based solely on family ties, so its increase is not proportional to the rise in production. This aligns with Saridewi, (2022) study, which states that the labor used in red chili farming in the study area does not significantly affect red chili production. This implies that increasing labor input will yield the same production volume.

Analysis of Farming Efficiency for Large Red Chili Peppers

Farming efficiency is a key indicator for assessing farmers' ability to manage resources optimally. Efficiency is a component of productivity that considers the ratio of output to input (Ashuri 2016). Therefore, when measuring efficiency, the most important step is to interpret the inputs and outputs of a production activity. The farming efficiency of large red chili peppers is shown in Table 2 below:

Table 2. Analysis of the Efficiency of Large Red Chili Farming

No	Variable Input (Xi)	Marginal Production (PMxi)	Input Price (Px) (IDR)	Value of Marginal Product (NPM)	Economic Efficiency (EE)	Description
1.	Land Area (X ₁)	443.688	83,044	548,397	6.60	Not Yet Efficient
2.	Seeds (X ₂)	12.51	3,999	15,475	3.86	Not Yet Efficient
3.	Urea Fertilizer (X ₃)	4.17	2,500	5,152	2.06	Not Yet Efficient
4.	Phonska Fertilizer (X ₄)	2.46	2,000	3,046	1.52	Not Yet Efficient
5.	Petrorganik Organic Fertilizer (X ₅)	1.14	1,000	1,375	1,375	Not Yet Efficient
6.	Demolish Pesticide (X ₆)	135.78	121,522	167,487	1.37	Not Yet Efficient
7.	Labor (X ₇)	58.92	81,612	73,261	0.89	Inefficiency

Source: Processed Primary Data, 2026

Table 2 above shows that land area (X₁) has a marginal product of 443,688, an input price of IDR. 83,044, value of marginal product (NPM) of 548,397, and an economic efficiency (EE) value of 6.60. An economic efficiency (EE) value of $6.60 > 1$ indicates that the use of land area in large red chili farming is not yet efficient. This means that additional land use or management can still increase farmers' profits. The larger the area of land managed effectively, the greater the opportunity for increased large red chili production. Thus, there is still potential to increase land area, whether through land expansion, land intensification, or improvements in cultivation techniques on available land.

Seeds (X₂) have a marginal product value of 12.51, an input price of IDR. 3,999, value of marginal product (NPM) of 15,475, and an economic efficiency (EE) value of 3.86. The economic efficiency (EE) value of $3.86 > 1$ indicates that seed use is not yet efficient. This means that seed usage can still be increased or its quality improved to boost the production of large red chili peppers. Seeds are a key factor in determining production success. Using high-quality, healthy seeds that are suited to the soil conditions can enhance plant growth and crop yield.

Urea fertilizer (X_3) has a marginal product value of 4.17, an input price of IDR. 2,500, value of marginal product (NPM) of 5,152, and an economic efficiency (EE) value of 2.06. The economic efficiency (EE) value of $2.06 > 1$ indicates that the use of urea fertilizer is not yet efficient. This means that the use of urea fertilizer can still be improved to achieve optimal efficiency. Urea fertilizer plays a role in providing the nitrogen needed by plants for vegetative growth. However, fertilizer application must still be adjusted to the plants' needs to avoid waste or soil degradation.

Phonska (X_4) fertilizer has a marginal product of 2.46, an input cost of IDR. 2,000, a value of marginal product (NPM) of 3,046, and an economic efficiency (EE) of 1.52. An economic efficiency (EE) of $1.52 > 1$ indicates that the use of Phonska fertilizer is not yet efficient. This means that the use of Phonska fertilizer can still be increased proportionally to boost the production of large red chili peppers. Phonska fertilizer contains the complex nutrients needed by plants, such as nitrogen, phosphorus, and potassium. Proper use of this fertilizer can help improve plant growth, flowering, and fruit formation.

Petroorganic organic fertilizer (X_5) has a marginal product value of 1.14, an input price of IDR. 1,000, value of marginal product (NPM) of 1.375, and an economic efficiency (EE) value of 1.375. The economic efficiency (EE) value of $1.375 > 1$ indicates that the use of petroorganic organic fertilizer is not yet efficient. This means that the use of organic fertilizer can still be improved to enhance soil fertility and support the growth of large red chili peppers. Organic fertilizer is crucial for improving soil structure, enhancing the soil's water-holding capacity, and increasing soil organic matter. Therefore, the proper use of organic fertilizer can help increase land productivity sustainably.

The demolit (X_6) pesticide has a marginal product value of 135.78, an input cost of Rp. 121,522, value of marginal product (NPM) of 167,487, and an economic efficiency (EE) value of 1.37. The economic efficiency (EE) value of $1.37 > 1$ indicates that the use of Demolit pesticide is not yet efficient. This means that pesticide use can still be improved to control plant pests and diseases more effectively. However, additional pesticide application must be done carefully according to the recommended dosage. Excessive pesticide use can increase production costs, pollute the environment, and have negative impacts on the health of both farmers and consumers.

Labor (X_7) has a marginal product of 58.92, an input cost of IDR. 81,612, value of marginal product (NPM) of 73,261, and an economic efficiency (EE) of 0.89. An economic efficiency (EE) of $0.89 < 1$ indicates that labor is being used inefficiently. This means that the labor costs incurred are greater than the additional value of production generated. Therefore, labor use needs to be reduced or managed more effectively. Farmers can adjust

work schedules, clarify task assignments, use simple agricultural tools, or improve labor skills so that labor costs are not too high.

Previous research findings by Meing & Setiaji, (2024) indicate that land area (X_1), seeds (X_2), organic fertilizer (X_3), and pesticides (X_7) are not yet efficient, while inorganic fertilizer (X_4), labor (X_5), and capital (X_6) are inefficient. In contrast, findings on the production efficiency of red chili farming indicate that the production factors of seeds (X_2) and fertilizer (X_4) were not yet efficient, while land area (X_1), labor (X_3), and pesticides were already efficient (Situmorang, Mardiana, and Zein 2025). The findings of this study are consistent with those of Adhiana, (2021), who argues that the low level of efficiency is due to inefficient resource allocation.

CONCLUSION

Based on the research results, it can be concluded that, according to the regression analysis, not all input variables have a significant effect on production (Y). The seed variable (X_2), urea fertilizer (X_3), and NPK Phonska fertilizer (X_4) have a positive and significant effect on Y because they have a significance value less than 0.05. Meanwhile, the variables of land area (X_1), petroorganic fertilizer (X_5), Demolish pesticide (X_6), and labor (X_7) do not have a significant effect on production (Y) because their significance values are greater than 0.05. All regression coefficients are positive, indicating that, in terms of direction, all independent variables tend to increase Y , although not all are statistically significant. Meanwhile, input efficiency suggests that most production factors have not yet been utilized optimally. The variables of land area (X_1), seeds (X_2), urea fertilizer (X_3), phonska npk fertilizer (X_4), petroganik organic fertilizer (X_5), and Demolish pesticide (X_6) have economic efficiency (EE) values > 1 , indicating that their use is not yet efficient and can still be improved. Meanwhile, labor input has an economic efficiency (EE) value < 1 , meaning its use is inefficient and needs to be reduced or better managed. Overall, large red chili farming still has opportunities to increase production and income through the optimization of production inputs, particularly land area, seeds, fertilizers, and pesticides, as well as labor cost control.

IMPLICATION

The implications of this study on the production efficiency of large red chili farming are that farmers need to ensure the appropriate and efficient use of production factors in order to increase yields and reduce production costs. The use of inputs such as land area, seeds, urea fertilizer, NPK Phonska fertilizer, petro-organic fertilizer, dolomite pesticide, and labor must be adjusted to the needs of the plants and soil conditions. The results of this study can also serve as input for agricultural extension workers and the government in developing

training programs, providing production facilities, and formulating policies to increase the productivity and income of large red chili farmers.

SUGGESTION

Based on the research findings, farmers of large red chili peppers are advised to use production factors appropriately and efficiently in order to reduce production costs and increase yields. The use of land area, seeds, urea fertilizer, NPK Phonska fertilizer, petro-organic fertilizer, dolomite fertilizer, and labor must be adjusted to the plants' needs. Agricultural extension workers are expected to provide guidance to farmers regarding cultivation techniques and the efficient use of inputs. The government is also expected to provide production facilities, training, as well as access to capital and markets for farmers. For future researchers, it is recommended to include additional variables and employ more in-depth analytical methods to ensure more comprehensive research results.

REFERENCES

- Adhiana, Martina, Riani, Suryadi. 2022. Analysis of the Technical Efficiency of Red Chili Farming in Sawang Subdistrict, North Aceh Regency, Using the Stochastic Frontier Approach. *Journal of Agribusiness-Oriented Scientific Thought* 8(1): 265–78. <https://jurnal.unigal.ac.id/>.
- Adhiana. 2021. Analysis of Factors Affecting Red Chili Production in Pidie Jaya Regency. *Agrica Ekstensia Journal* 15(1): 82–92. <https://repository.pertanian.go.id/server/api/core/bitstreams/10537e38-95a3-4cc9-a3f6-95d21faf3ec0/content>.
- Afif Setyadi, Agus Setiadi, Titik Ekowati. 2020. Analysis of Production Factors Affecting the Production of Curly Red Chili Peppers (*Capsicum annuum* L.) in Sumowono Subdistrict, Semarang Regency. *Journal of Agricultural Economics and Agribusiness (JEPA)* 4(4): 850–69. <https://jepa.ub.ac.id/index.php/jepa/article/view/534/276>.
- Agi Dahtiar. 2025. Analysis of the Efficiency of Red Chili (*Capsicum annuum* L.) Farming. *Paspalum: Scientific Journal of Agriculture*. 13 No. 2: 35138. <https://journal.unwim.ac.id/index.php/paspalum/article/view/1129>.
- Ashuri, Wawan Cahyono. 2016. Analysis of Production Factors and the Feasibility of Red Chili Farming in Sei Gohong Village, Bukit Batu District, Palangka Raya City. *J-SEA (Journal Socio Economics Agricultural)* 13(1): 1–7. <https://e-journal.upr.ac.id/index.php/j-sea/article/view/485>.
- Dharmaraja, S, Vidyottama Jain, and Priyanka Anjoy. 2020. Empirical Analysis For Crop Yield Forecasting in India. *Journal Agricultural Research* 9(1): 2020. <https://link.springer.com/article/10.1007/s40003-019-00413-x>.



- Effendi, Sadrian Noor et al. 2019. Insect Diversity Associated with Large Red Chili Plants (*Capsicum annum* L.) in the Loktabat Utara Subdistrict of Banjarbaru. *Journal of Tropical Plant Protection* 2(01): 76–80. <https://jtam.ulm.ac.id/index.php/jpt/article/view/45>.
- Fivintari, Francy Risvansuna, and Anis Shofiyah. 2024. Red Chili Farming On Coastal Sand Land With Shower Irrigation System : A Review of Production Efficiency. *Agricultural Economic and Business*, 01030: 3–8. <https://www.e3s-conferences.org/>.
- Josina I.B.Hutubessy. 2017. The Effect of Phonska NPK Fertilizer on the Growth and Yield of Intercropped Chili Peppers (*Capsicum annum* L.) and Red Onions (*Allium cepa* L.). *Agrica* 10(1): 8–16. <https://e-journal.uniflor.ac.id/index.php/Agr/article/view/76>.
- Katarina Betea, dan Werenfridus Taenab. 2018. Factors Affecting the Production of Red Chili Peppers in Tapenpah Village, Insana Subdistrict, North Central Timor Regency. *Agrimor* 3(1): 7–9. <https://jurnal.unigal.ac.id/mimbaragribisnis/article/view/46/45>.
- Kuswarini Kusno, Sauma Hanuuf, Pandi Pardian, Eti Suminartika. 2020. Prospects for the Development of Red Chili (*Capsicum Annum* L.) Farming in Sukalaksana Village, Banyuresmi Subdistrict, West Java. *Unpad Journal of Agribusiness and Agricultural Socioeconomics* 5(2615): 94–103. <https://jurnal.unpad.ac.id/agricore/article/view/28662>.
- Marni, Afriansyah, Esther Kembauw, Munajat, Susi., 2022. Basic Principles of Agricultural Economics. https://www.researchgate.net/publication/362762382_prinsip_dasar_ekonomi_pertanian.
- Meing, Restituta D A Da, And Jatmiko Setiaji, 2024. Analysis of Production Efficiency In Red Onion Farming In Torongrejo Village, Junrejo District, Batu City. *Jurnal Buana Sains* 24(3): 79–86. <https://jurnal.unitri.ac.id/index.php/buanasains>.
- Munita Wati, Ir. H. Noor Djohar, MM, Deviana Diah P, SP, MSi. 2020. Efficiency of Input Use In Red Chili Farming. *Journal Oryza* 5(1): 6–14. <https://ojs.ejournalunigoro.com/index.php/oryza/article/view/725/517>.
- Nor Shella Priyastuti. 2021. The Effect of Raw Materials, Labor, and Capital on Gambir Opak Industry Production in Plosokerep Village, Sananwetan District, Blitar City. *Jurnal Agro Ekonomi*. <http://repo.uinsatu.ac>.
- Nyak Yusfa Afrina, Ruhalela Wilis, Imam Fachrul Mizan. 2018. Response of Red Chili Plant Growth and Production to Planting Distance and Pruning. *Agrida Journal: Scientific Journal of Agriculture* 3(1): 1–10. <https://ejournal.unida-aceh.ac.id/agrida/article/view/745/619>.
- OECD. 2025. *Agricultural Policy Monitoring and Evaluation 2025 Agricultural Policy Monitoring and Evaluation*. <https://www.oecd.org/en/publications/agricultural->



- policy-monitoring-and-evaluation-2025_a80ac398-en.html.
- Purnomo, Joko et al. 2016. Hydroponic Cultivation of Bird's Eye Chili Using Substrate with Variations in Growing Media and Nutrients. *Caraka Tani: Journal of Sustainable Agriculture*. 31(2): 129–36. <https://jurnal.uns.ac.id/carakatani/article/view/11996/10518>.
- Raihan Hanafi. 2017. Analysis of Production Factor Utilization Efficiency in Small and Medium-Sized Furniture Industries in Pekanbaru. *Doctoral Dissertation*, 4: 883–97. <https://jom.unri.ac.id/>.
- Ramirez et al., 2003. 2003. American Journal of Agricultural Ekonomis. *Journal of Agricultural Economics* 85(1): 120. <https://onlinelibrary.wiley.com/>.
- Ruzhani, Freddy, and Abbyssinia Mushunje. 2025. Technical Efficiency In Agriculture : A Decade-Long Meta-Analysis of Global Research. *Journal of Agriculture and Food Research* 19(November 2024): 101667. <https://doi.org/10.1016/j.jafr.2025.101667>.
- Saptana, Arief Daryanto, Heny K. Daryanto, and Dan Kuntjoro. 2016. Facing Risks: Analysis of Production and Technical Efficiency in Great Red Chili Farming and Farmers' Behavior in Dealing with Risks. *Jurnal Agro Ekonomi* 28 no 2: 153–88. <https://media.neliti.com/media/publications>.
- Saridewi, Larasati Puspita. 2022. Farming Efficiency of Red Chili Peppers in Mirit Subdistrict, Kebumen Regency. *Journal of Agribusiness Science and Rural Development Vol. 2*(2): 1–8. <https://jurnal.universitaspurabangsa.ac.id/index.php/jasrd/article/view/110>.
- Situmorang, Irene, Siti Mardiana, and Zahari Zein. 2025. Analysis of Production Efficiency in Red Chili Farming in North Sumatra Province. *Jurnal Agribios* 23(01): 82–96. <https://doi.org/10.36841/agribios.v23i1.6005>.
- Soekartawi et al., (2011). *Agricultural Science*. University of Indonesia Press. <https://library.unindra.ac.id/>.
- Sri Ayu Andayani. 2016. Factors Affecting Red Chili Pepper Production. *Mimbar Agribisnis* 1(3): 261–68. <https://jurnal.unigal.ac.id/mimbaragribisnis/article/view/46/45>.
- Subaedah. 2018. *Dryland Agrotechnology*. Makassar: CV. Nas Media Pustaka. <https://www.scribd.com/document/511105161/Buku-Agroteknologi-Lahan-Kering>.
- Sukiyono, Ketut, and Miftahul Janah. 2019. Forecasting Model Selection of Curly Red Chili Price. *Journal of Agricultural Research* 02(01): 1–13. <https://talenta.usu.ac.id/injar/article/view/859/529>.
- Tuti Karyani, Sumarno Tedy. 2021. Analysis of Production Factors To The Curly Red Chili (*Capsicum Annum L.*) Farming By Applying AttractanS (A Case in Pasirwangi Sub District, Garut Regency). *Mimbar Agribisnis* 7(1): 74–93. <https://jurnal.unigal>.



[ac.id/mimbaragribisnis/article/view/3935](https://ejournal.unja.ac.id/mimbaragribisnis/article/view/3935).

Walter Nicholson Christopher Snyder. 2012. *Microeconomic Theory*. <https://zalamasyah.staff.unja.ac.id/>.

Yarred Assefa. 2013. *Times Series And Spatial Analysis of Crop Yield*. https://www.researchgate.net/publication/283504693_time_series_and_spatial_analysis_of_crop_yield.

