International Journal of Thesis Projects and Dissertations (IJTPD)
Vol. 12, Issue 3, pp: (32-43), Month: July - September 2024, Available at: www.researchpublish.com

The Efficiency Analysis of Input Use of Cayenne Pepper Farming on Water Pump Irigation Land in Pringgabaya District, East Lombok Regency

Gina Sorayya[1], Halimatus Sa'diyah[2], Addinul Yakin[2], Tajidan Tajidan[2], Muhammad Yusuf[2]

[1] Student of Agribusiness Master's Program, Agriculture Faculty, University of Matara, Mataram, Indonesia

[2] Lecturer of the Agriculture Faculty, University of Mataram, Mataram, Indonesia

DOI: https://doi.org/10.5281/zenodo.13133353

Published Date: 30-July-2024

Abstract: **Pringgabaya District is one of the cayenne pepper producing districts in East Lombok Regency. In general, farmers grow cayenne pepper using surface irrigation, but here some of the farmers who farm cayenne pepper using paid water pump irrigation. The existence of irrigation costs causes additional input costs compared to farming that uses surface irrigation. This research aims to: (1) Analyze the costs and income of Cayenne Pepper Farming on Pumped Water Irrigation Farms in Pringgabaya District, (2) Analyze the Efficiency of Using Cayenne Pepper Farming Inputs on Pumped Water Irrigation Farms in Pringgabaya District. The research method used is descriptive research method. The number of respondents was 30 farmers. The types of data used are qualitative data and quantitative data. The data collection technique was carried out using the survey method. The research results show that: (1) The average production costs incurred are IDR 18,897,381/LLG or IDR 39,924,043/Ha. Meanwhile, the farmer's income is Rp. 26,148,786/LLG or Rp. 55,243,914/Ha, (2) The production factor of area of cultivated land, number of seeds and use of Antracol pesticide has an Efficiency value (NPMxi/Pxi) > 1, which means Not Yet Efficient. Meanwhile, Urea fertilizer, NPK Phonska fertilizer, Prevathon pesticide, the amount of water used, and the use of labor have an efficiency value (NPMxi/Pxi) < 1, which means it is not efficient.**

Keywords: **Input Use Efficiency, Cayenne Pepper Farming, Pump Water Irrigation, Pringgabaya District.**

I. INTRODUCTION

In West Nusa Tenggara Province, the agricultural sector is one of the leading sectors driving the economy of West Nusa Tenggara itself. This can be seen from the potential land resources owned by NTB for the agricultural sector which are still quite large. According to data from BAPPEDA NTB, NTB Province has a comparative advantage in the form of quite extensive agricultural land (1,673,476 hectares), which is more than 84% of NTB's land area (2,010,249 hectares). The level of land ownership is quite large in dry land (1.75-2.0 hectares per family) compared to wet land (0.25 hectares per family), the abundant diversity of crop and livestock commodities is a large enough capital to alleviate poverty through efforts to increase agricultural production (Maharani and Suherman, 2019). The horticultural commodity that has the potential to be developed in West Nusa Tenggara is cayenne pepper. The increase in public demand for vegetable commodities, especially cayenne pepper, is followed by an increase in the amount of production each year (NTB Provincial Agriculture and Plantation Service 2018).

East Lombok Regency is one of the districts in West Nusa Tenggara Province with quite extensive agricultural areas followed by dry land that has the potential to be developed. In this condition, the challenge faced by farmers is the scarcity of water resources. To overcome this problem, the NTB Regional Government is trying to build water pumps through the Groundwater Development Project (P2AT) of the Department of Public Works, the number of which has now reached 495 units, consisting of 314 units on Lombok Island and the rest on Sumbawa Island (Sa'diyah, 2023). Pringgabaya District is one of the dry land areas that receives the P2AT program in East Lombok Regency. Before this program existed, farmers in Pringgabaya District could not farm all year round due to limited water resources. So, after the existence of P2AT, it is possible for farmers to farm throughout the year, namely for 3 consecutive planting seasons with the same or different plant combinations. One of the plants that is widely cultivated in this district is cayenne pepper. According to data from the Central Statistics Agency for Pringgabaya District, the harvest area, production amount and productivity for cayenne pepper plants are attached in the Table 1.

Table 1. Harvested Area, Production Amount, and Productivity of Cayenne Pepper Plants in Pringgabaya District 2017-2021

Year	Harvested Area (Ha)	Production (Kw)	Productivity (Kw/Ha)
2017	278	155,608	559.7
2018	871	373,672	429.0
2019	549	23,537	42.8
2020	1030	190,273	184.7
2021	701	165,408	236.0

Source: Pringgabaya District Central Statistics Agency, 2018-2022

Based on the Table 1, it shows that the harvest area and production of cayenne pepper in Pringgabaya sub-district experienced fluctuations from 2017 to 2021, but productivity experienced a continuous decline, especially in the last two years, namely 2020-2021 (BPS NTB 2022). This problem can be influenced by various factors such as inappropriate use of agricultural resources, limited water resources, or climate change. So the amount of use of existing resources needs to be taken into account, such as the amount of fertilizer and seeds appropriate to the area of land owned or the amount of irrigation during one planting season.

Apart from that, in farming there are of course obstacles found in the field. This can be seen from information about crop failures at several production times. As a result of this crop failure, many farmers have begun to reduce their cayenne pepper farming activities on groundwater irrigated land. However, these obstacles are not yet known in detail, so research needs to be carried out. Based on the description above, research has been carried out entitled " **Efficiency Analysis of the Use of Cayenne Pepper Farming Inputs on Pump Water Irrigation Land in Pringgabaya District** ".

This research aims to: (1) Find out the costs and income of Cayenne Pepper Farming on Pump Water Irrigation Farms in Pringgabaya District, (2) Find out the Efficiency of Using Cayenne Pepper Farming Inputs on Pump Water Irrigation Farms in Pringgabaya District.

II. RESEARCH METHODS

Research Methods

The research method used in this research is descriptive research method. This method aims to describe, explain, or can also provide validation of the phenomenon being researched (Ramdhan, 2021). The unit of analysis in this research is cayenne pepper farming on pump water irrigation land in Pringgabaya District. Determining the research area was determined using "purposive sampling", namely a technique for determining samples with certain considerations (Ariska et al, 2020). This research was carried out in North Pringgabaya village, Labuhan Lombok village, and Gunung Malang village. Determining the number of respondents was carried out using "quota sampling", namely taking a non-random sample of 30 farmers which involved identifying groups in a population (Firmansyah and Dede, 2022).

The types of data used in this research are qualitative data and quantitative data. Qualitative data was obtained from interviews and observations, while quantitative data was obtained from data measurement results (Ardiansyah et al, 2023). The data sources used in this research are primary data and secondary data. Primary data is information obtained for the first time by researchers regarding the variables that are the main research objectives. Meanwhile, secondary data is information collected from existing sources (Balaka, 2022). The data collection technique in this research was carried out using a survey method, namely, to obtain data from certain places (Arifin, 2020). The analytical method used is Estimation of the Production Function of Cayenne Pepper on Pump Water Irrigation Land in Pringgabaya subdistrict, East Lombok district.

Data Analysis

1. Analysis of Farming Costs and Income

To determine the amount of costs and income of farmers in cayenne pepper farming on pumped water irrigation land in Pringgabaya District, East Lombok Regency, the following formula is used (Bakari, 2019):

$$TC = FC + VC$$

Information: TC = Total Cost (Total Cost) (Rp)

FC = Fixed Cost (Fixed Cost) (Rp)

VC = Variable Cost (Variable Cost) (Rp)

Meanwhile, to find out the total revenue per harvest, it can be determined using the following formula:

$$TR = Y.Py$$

Note: TR = Total Revenue (Rp/Ha)

Y = Total Production (Kg/Ha)

Py = Production Price (Rp/Kg)

To determine the level of income of farmers in cayenne pepper farming on pump-irrigated land, use the following formula:

$$I = TR – TC$$

Information: I = Income (Revenue) (Rp/Ha)

TR = Total Revenue (Total Revenue) (Rp/Ha)

TC = Total Cost (Total Cost) (Rp/Ha)

2. Estimation of the Production Function of Cayenne Pepper on Pumped Water Irrigation Land in Pringgabaya District

Selected production factors in cayenne pepper farming on pumped water irrigated land are land area, seeds, urea fertilizer, phonska fertilizer, anthracol pesticide, prevathon pesticide, the amount of water used, and the amount of labor used. To study the relationship between the use of production factors and the production of cayenne pepper farming, a regression model was used using the Cobb Douglas production function model with the following formula (Jono, 2016):

$$Y = aX_1^{b1}.X_2^{b2}.X_3^{b3}.X_4^{b4}.X_5^{b5}.X_6^{b6}.\ X_7^{b7}.e$$

Information:

Y = Cayenne Pepper Production (Kg)

X_1 = Area of Arable Land (Ha)

X_2 = Number of Seeds used (Trees)

X_3 = Amount of Urea Fertilizer used (Kg)

X_4 = Amount of Phonska NPK Fertilizer used (Kg)

X_5 = Amount of Antracol Pesticide used (Kg)

X_6 = Amount of Prevathon Pesticide used (Liters)

X_7 = Amount of water used (m3)

X_8 = Number of Workers Used (HKO)

a = Constant

b1 – b6 = Regression coefficient

e = Residual error

The relationship between production factors in the form of land area, seeds, urea fertilizer, phonska fertilizer, anthracol pesticide, prevathon pesticide, amount of water used, and the amount of labor used in cayenne pepper farming with cayenne pepper production can be determined by carrying out multiple linear regression. Therefore, the Cobb Douglas production function must be converted into linear form by logarithmicizing it to (Dewi et al, 2018):

$$LnY = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_n \ln X_n + e$$

To analyze the efficiency of input use in cayenne pepper farming on pump water irrigation land in Pringgabaya District, the price efficiency formula (allocative efficiency) is used. It is said to be price efficiency or allocative efficiency, if the value of marginal product (NPM) is the same as the price of the production factor (Px) in question or can be written as follows (Fadlillah et al, 2016):

$$\frac{b.Y.Py}{X} = Px \text{ or } \frac{b.Y.Py}{X.Px} = 1$$

$$NPM = \frac{b.Y.Py}{X} \text{ so } NPM = Px$$

Where:

b = Production elasticity of cayenne pepper farming

Y = Cayenne pepper production

Py = Production price of cayenne pepper

X = Number of cayenne pepper production factors

Px = Price of cayenne pepper production factors

NPM = Marginal Product Value

Assessment criteria:

a NPMxi/Pxi = 1, meaning that the use of input (x) is efficient.

b NPMxi/Pxi > 1, meaning that the use of input (x) is not efficient.

c NPMxi/Pxi < 1, meaning that the use of input (x) is inefficient.

3. Barriers to Cayenne Pepper Farming

To analyze the obstacles faced by cayenne pepper farmers, this is done by interviewing farmers regarding the obstacles they face while farming cayenne peppers on pump-irrigated land which is then analyzed descriptively.

III. RESULTS AND DISCUSSION

1. General Description of Cayenne Pepper Farming on Pumped Water Irrigation Land in Pringgabaya District

In general, cayenne pepper plants are planted in areas with an altitude of 0-500 meters above sea level. Usually, cayenne pepper farming uses river water irrigation, but in this study, respondents planted cayenne peppers on pump-irrigated land. Cayenne pepper is a type of plant that can live up to one year. So, seeds or seeds are only planted once and then the cayenne pepper fruit can be harvested many times until the plant's ability to produce fruit is exhausted. Cayenne pepper farming activities on pump-irrigated land carried out by respondent farmers in Pringgabaya District are as follows:

a. Land Preparation

In the land preparation process, the process of loosening the soil, applying basic fertilizer, making beds measuring around 150x50cm, making water channels and irrigation is carried out. In farming on pump-irrigated land, farmers do not use mulch and bamboo stakes because they do not use seeds when planting but instead use seeds that have been sown and are just ready to plant.

b. Planting

Cayenne pepper plants are usually planted in the second planting season, namely from April to July. After the land is irrigated, planting is carried out with a spacing of around 60x40cm. If the length of irrigation takes a lot of time, then planting is done the day after in the morning, but if the length of irrigation does not require too much time, then planting is done in the afternoon of the same day.

c. Weeding

Weeding or weed control aims to ensure that cayenne pepper plants do not lose nutrients due to weed growth. Weeding is adjusted to weed growth but is done at least 3-4 times during the growing season. If there is a lot of weed growth, this is usually done once a week. Weeding is done using a manual agricultural tool, namely a sickle.

d. Fertilization

After the chili plants are 2-4 weeks old, the plants begin to be given fertilizer. There are many fertilizers that farmers use during the fertilization process, and fertilization is done in stages. In this research, the author focuses on the use of Urea and Phonska fertilizers.

e. Spraying

In general, pests that attack cayenne pepper plants are leaf caterpillars, wilt disease, and stem and leaf rot. Similar to weeding, spraying is carried out when the cayenne pepper plants start to be attacked by pests and is adjusted to the level of attack but is done at least once every 2 weeks. Spraying is carried out using a sprayer equipped with a tank.

f. Harvest

Cayenne pepper plants can only be harvested after they are 3-4 months old. Based on the results of interviews with respondent farmers in Pringgabaya District, farmers who grow chilies on pump-irrigated land usually harvest once a week.

2. Production Costs and Income from Cayenne Pepper Farming on Pump Water Irrigation Land in Pringgabaya District

a. Production Cost Analysis

The production costs of cayenne pepper farming referred to in this research are the total costs incurred by farmers during the production process in cayenne pepper farming on pump water irrigated land in Pringgabaya sub-district, East Lombok Regency in one production process per planting season which consists of variable costs and costs. still.

1) Variable Costs

Variable costs are costs incurred by farmers whose size is influenced by the production costs incurred during the production process, where these variable costs include the costs of production facilities and the costs of labor wages.

Table 2. Variable Costs of Cayenne Pepper Farming on Pumped Water Irrigation Land in Pringgabaya District 2024

Variable Costs	Price per Unit per area of cultivated land	Per area of cultivated land Total Value (Rp)	Per 1 Ha Total Value (Rp)
Seedlings (Trees)	167	8,277 1,354,675	17,487 2,861,989
Fertilizer:			
Urea (Kg)	2,800	121 338,333	255 714,789
NPK Phonska (Kg)	1,500	217 325,750	459 688204
Total fertilizer		338 664083	714 1,402,993
Pesticides:			
Anthracol pesticide (kg)	120,000	2 234,000	4 494,366
Prevathon Pesticide (ltr)	480,000	0.2 88,400	0.4 186,761
Total pesticides		322,400	681.127
TKDK (HKO)		39 2,533,667	82 5,352,817
TKLK (HKO)		221 7,271,167	466 15,361,620
Total Labor		**259.5 9,804,833**	**548.24 20,714,437**
Irrigation Fee (m^3)	621	4,830 3,022,000	10,204 6,384,507
Total Variable Costs		**15,167,992**	**32,045,053**

Source: Primary data processed, 2024

In Table 2 it can be seen that the average variable costs incurred by respondent farmers in one production process of cayenne pepper farming on pump-irrigated land in Pringgabaya District is IDR 15,185,658/LLG or IDR 32,082,377/Ha. The variable cost most frequently incurred by respondent farmers is labor costs, namely IDR 9,804,833/LLG or IDR 20,714,437/Ha.

b. Fixed cost

The fixed costs referred to in this research are the costs paid by farmers for farming during one planting season. Based on Table 3, it is explained that the average amount of fixed costs incurred in cayenne pepper farming in one production process includes, among other things, land tax costs of IDR 35,567/LLG or IDR 75,141/Ha, land rental costs of IDR 3,366,667/LLG or IDR 7,112,676/Ha, and equipment depreciation costs of IDR 233,693/LLG or IDR 493,717/Ha, so the total fixed costs incurred are IDR 3,635,926/LLG or IDR 7,681,534/Ha.

Table 3. Fixed Costs of Cayenne Pepper Farming on Pumped Water Irrigation Land in Pringgabaya District 2024

Description of Fixed Costs	Value (Rp)	
	Per area of cultivated land	Per Ha
Land Tax Fees	12,183	25,739
Land Rental Costs	3,366,667	7,112,676
Equipment Depreciation Costs	350,539	740,575
Amount	**3,729,389**	**7,878,991**

Source: Primary data processed, 2024

c. Total Production Costs

Total production costs are all costs incurred during the production process which include variable costs and fixed costs. Based on Table 4, the average production cost of cayenne pepper farming on pump water irrigation land in Pringgabaya District is IDR 18,821,584/LLG or IDR 39,763,910/Ha where these costs include variable costs and fixed costs, the production costs which are mostly incurred are namely variable costs of IDR 15,185,658/LLG or IDR 32,082,377/Ha.

Table 4. Production Costs of Cayenne Pepper Farming on Pumped Water Irrigation Land in Pringgabaya District 2024

Description of Production Costs	Value (Rp)	
	Per area of cultivated land	Per Ha
Variable Costs	15,185,658	32,082,377
Fixed cost	3,635,926	7,681,534
Amount	**18,821,584**	**39,763,910**

Source: Primary data processed, 2024

2. Production, Production Value and Income of Cayenne Pepper Farming

The production referred to in this research is the amount of production obtained by farmers in one planting season (kg). Production value is the product of the amount of cayenne pepper production and the production price per unit kg expressed in rupiah in effect during the current planting season. Furthermore, the income referred to in this research is the difference between the production value (revenue) and the total production costs (expenses) incurred by farmers in their farming activities.

Table 5. Production, Production Value, Production Costs, Income and R/C Ratio of Cayenne Pepper Farming on Pump Water Irrigation Land, Pringgabaya District, East Lombok Regency

Description	Per area of cultivated land	Per Ha
Production (Kg)	2,636	5,576
Production Value (Rp)	45,073,000	95,224,648
Production Costs (Rp)	18,821,584	39,763,910
Income (Rp)	26,251,416	55,460,737
R/C	**2.39**	**2.39**

Source: Primary data processed, 2024

Table 5 shows that the average production produced by farmers in cayenne pepper farming on pump water irrigated land in Pringgabaya district, East Lombok district is 2,639 kg/LLG or 5/576 kg/ha with a price level of IDR 17,026/LLG or IDR. 36,046/ha, then a production value of IDR 45,073,000/LLG or IDR 95,224,648/Ha is obtained. The production value is reduced by production costs of IDR 18,821,584/LLG or IDR 39,763,910/Ha to obtain an income of IDR 26,251,416/LLG or IDR 55,460,737/Ha.

The R/C ratio (Revenue Cost Ratio) of cayenne pepper farming on pumped water irrigation land in Pringgabaya District, East Lombok Regency is 2.39, meaning that for every use of production costs of Rp. 1000 you will get a production value of 2,390. With this R/C value, cayenne pepper farming on pumped water irrigation land in Pringgabaya District, East Lombok Regency can be said to be feasible to develop in terms of costs and revenues. This is in line with research by Afifah et al (2024) which states that the feasibility of farming cayenne pepper with drip irrigation The amount obtained for 5 harvests with a land area of 227.5m2 ^{is} 1.22, which means that for every Rp. 1,000 spent you will receive a large income of Rp. 1,220. This shows that cayenne pepper farming with drip irrigation on dry land is still feasible to develop. The R/C Ratio value will certainly increase if the harvest is carried out optimally.

b. Estimation of the Production Function of Cayenne Pepper on Pumped Water Irrigation Land in Pringgabaya District

Several factors identified are factors that influence the production of cayenne pepper in Pringgabaya District, East Lombok Regency, including: The area of cultivated land, the amount of use of seeds, urea fertilizer, phonska fertilizer, Anthracol pesticide, Prevathon pesticide, amount of water use and labor use. Next, to determine the effect of each independent variable (X) on the dependent variable (Y), namely cayenne pepper production, this is done by looking for parameter values or regression coefficients (βi) using the Cobb-Douglass production function.

The results of the analysis using the Cobb-Douglas function obtained the following production function:

$$\mathbf{Y = -7.663.\beta 1^{1.031}.\beta 2^{0.031}.\beta 3^{-0.001}.\beta 4^{-0.036}.\beta 5^{0.031}.\beta 6^{-0.05}.\beta 7^{-0.004}.\beta 8^{-0.007}}$$

The results of the analysis are more clearly presented in the following Table 6:

Table 6. Analysis of factors influencing cayenne pepper farming on pump water irrigation land in Pringgabaya District 2024

Model	Unstandardized Coefficients		p-value	Sign/Non
	Symbols	Ms		
(Constant)	β0	7.98883	7.15E-12	
LLG (X1)	β1	1.01793	8.90E-10	Significant
Seedlings (X2)	β2	0.03382	0.510421	Non-Significant
Urea Fertilizer (X3)	β3	-0.0254	0.610586	Non-Significant
Phonska Fertilizer (X4)	β4	0.04144	0.041286	Significant
Antracol Pesticide (X5)	β5	-0.0315	0.044702	Significant
Prevathon Pesticide (X6)	β6	-0.0305	0.012186	Significant
Water (X7)	β7	0.00014	0.984536	Non-Significant
Labor (X8)	β8	0.04098	0.350447	Non-Significant
F-Count		5920.61		
F-Table		2.42		
R^2		0.999		

Source: Primary data processed, 2024

a. Simultaneous Regression Testing

Based on the results of data analysis (Table 6), the calculated F-value = 5947 > F-Table = 2.42. This significance shows that the independent variable (Xi) simultaneously has a real effect on the dependent variable (Y). Furthermore, this situation is supported by the coefficient of determination ($R^2 = 0.999$). This value means that all independent variables included in the model can determine the dependent variable by 99.9%, while the rest is determined by other variables that are not included in the model such as soil fertility level, rainfall, prices of substitute goods, and so on.

b. Interpretation of Regression Coefficient Values and Partial Regression Coefficient Testing

Based on the regression equation (Cobb-Doglass function), of the 8 independent variables, only Arable Land Area and Antracol Pesticides have a significant effect on the influence of production. The regression coefficient values obtained for each independent variable can be interpreted as follows:

The results of the analysis of the p-value of Arable Land Area at $\alpha = 0.05$ are 0.00000000123 (< 0.05) with a regression coefficient of 1.017. This shows that land area has a real (Significant) effect on cayenne pepper production at $\alpha = 5\%$, so every time the land area variable is added by 1% and other variables are considered constant, it will cause cayenne pepper production to increase by 1.017%. Thus, farmers still need to increase or expand the planting area so that they can increase the number of cayenne pepper populations and increase cayenne pepper production. This is in accordance with the results of research by Novi Nurhayati & Evi Purnama Sari (2020) which states that the more land owned by food farmers will increase the farmer's opportunity to produce more.

The results of the analysis of the p-value for Seedlings at $\alpha = 0.05$ are 0.545 (> 0.05) with a regression coefficient of 0.033. This shows that the number of seeds has no real (non-significant) effect on the production of cayenne pepper at $\alpha = 5\%$, but if its use is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production increases by 0.033%. So, by increasing the number of seeds you can increase the amount of cayenne pepper production. This is in accordance with research by I Made Alit Dharma Saputra and I Wayan Wenagama (2019) which states that if the use of seeds is increased by 1 percent, the amount of chili production will increase by 0.726 percent, assuming the other independent variables are in a constant condition.

The results of the analysis of the p-value of Urea fertilizer at $\alpha = 0.05$ are 0.981 (> 0.05) with a regression coefficient of -0.025. This shows that Urea Fertilizer has no real (non-significant) effect on cayenne pepper production at $\alpha = 5\%$ so that if the variable use of urea fertilizer is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production will decrease by 0.025%. Thus, farmers' efforts to reduce the use of urea fertilizer can increase cayenne pepper production. This is in accordance with research by Adhiana et al (2022) which states that the fertilizer variable has a negative value on red chili production with a coefficient value of -0.0535, meaning that if the amount of fertilizer is increased by 1% it will reduce red chili production by 0.0535% with the assumption other variables are considered constant (cateris paribus).

The results of the analysis of the p-value of Phonska NPK fertilizer at $\alpha = 0.05$ are 0.136 (> 0.05) with a regression coefficient of 0.041. This shows that Phonska NPK fertilizer has no real (non-significant) effect on rice production at $\alpha = 5\%$. However, if use is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production will increase by 0.041%. Thus, farmers' efforts to increase the use of Phonska fertilizer can increase cayenne pepper production. This is in accordance with research by Febriyana et al (2023) which states that NPK fertilizer given to chili plants can accelerate fruit growth on chili plants. The recommendation for giving NPK fertilizer to chili plants is when the plants are 30 – 50 days old.

The results of the analysis of the p-value of Antracol pesticide at $\alpha = 0.05$, namely 0.0186 (> 0.05) with a regression coefficient of -0.031. This shows that the pesticide Antracol has no real (non-significant) effect on cayenne pepper production at $\alpha = 5\%$. However, if use is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production will decrease by 0.031%. This means that the use of the pesticide Antracol needs to be reduced in order to increase production. The results of the analysis of the p-value of Prevathon pesticide at $\alpha = 0.05$ are 0.063 (> 0.05) with a regression coefficient of -0.030. This shows that Prevathon Pesticide also shows that this variable has no real (non-significant) effect on cayenne pepper production at $\alpha = 5\%$. So, if use is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production will decrease by 0.030%. This means that the use of Prevathon pesticide needs to be reduced in order to increase production. These two conditions for pesticide use are in accordance with research by Agustina et al (2023) which states that the conditions in the research area are that cayenne peppers are susceptible to pests and disease, which causes intensive use of pesticides. Farmers spray pesticides intensively from 1 month of age until harvest with an average pesticide use of 3.5 liters/0.3 ha. Where the use of pesticides that are not in the correct dosage will result in plant pest organisms (OPT) being resistant to pesticides.

The results of the p-value analysis of the amount of water used at $\alpha = 0.05$ are 0.787 (> 0.05) with a regression coefficient of 0.0001. This shows that the amount of water used has no real (non-significant) effect on cayenne pepper production at $\alpha = 5\%$. However, if use is increased by 1% and other variables are considered constant, then the amount of cayenne pepper production will increase by 0.0001%. This means that water use can still be increased further in order to increase production.

The results of the analysis of the p-value of Labor at α = 0.05 are 0.871 (> 0.05) with a regression coefficient for the use of labor (β8) of 0.040. This shows that the number of workers has no real (non-significant) effect on cayenne pepper production at α = 5%. However, if use is 1% and other variables are considered constant, then the amount of cayenne pepper production increases by 0.040%. This means that the use of labor can still be increased further in order to increase the amount of production. This is in accordance with research by Muhammad Yusuf and Dudi Septiadi (2024) which states that the Labor Variable (X7) has a calculated t value of 0.335 < t table = 1.987 with a negative coefficient value of 0.025, which means that the labor variable partially has no real effect on chili production. cayenne.

c. Allocative Efficiency of Input Use

The allocative efficiency of input use in rice farming activities can be determined by calculating the ratio of marginal product value to the price of each input used per unit (NPMx/Px).

The results of the allocative efficiency analysis of input use are:

Table 7. Allocative Efficiency Analysis of Cayenne Pepper Farming on Pump Water Irrigation Land in Pringgabaya District 2024

Variable	Efficiency Value (NPMXi/PXi)	Efficiency Criteria	Information
LLG (X1)	13.74	> 1	Not yet efficient
Seedlings (X2)	1.06	> 1	Not yet efficient
Urea Fertilizer (X3)	-0.16	< 1	Not efficient
Phonska Fertilizer (X4)	-9.72	< 1	Not efficient
Solid Pesticide (X5)	7.48	> 1	Not yet efficient
Liquid Pesticide (X56)	-21.75	< 1	Not efficient
Water (X7)	0.00	< 1	Not efficient
Labor (X8)	-0.01	< 1	Not efficient

Source: Primary data processed, 2024

1) Allocative Efficiency of Cultivated Land Area Variables (X1)

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pumped water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value for the area of cultivated land is 13.74, which indicates that the land use allocation is not yet efficient because the NPMxi/Pxi value is > 1. So the use of arable land area can still be increased further, but by increasing the land area in smaller amounts until it reaches the point of maximum efficiency or profit. This is in accordance with research on the image of Yuli and Hadayani (2022) which states that the land area variable with a value of k = 25.80 > 1. This means that the use of land area for cayenne pepper farming in terms of price efficiency in Maku Village is not yet efficient or is still insufficient so that needs to be expanded, in order to increase cayenne pepper production in Maku Village, which will result in an increase and welfare of cayenne pepper farmers.

2) Seed Variable Allocative Efficiency (X2)

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigated land in Pringgabaya District, it is known that the NPMxi/Pxi value for the number of seeds is 1.06, which indicates that the allocation of seed use is not yet efficient because the NPMxi/Pxi value is > 1. So The use of seeds can still be increased, but by adding fewer and fewer seeds until they reach the point of maximum efficiency or profit. This is in accordance with research by Nila Maemunah et al (2019) which states that the use of production factors for the number of seeds is not technically efficient and not economically efficient. Technically there is no need to add production inputs for cayenne pepper farming, but because input prices are relatively low, it is necessary to add inputs to a certain limit to achieve economic efficiency.

3) Urea Fertilizer Variable Allocative Efficiency (X3)

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pumped water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value of Urea fertilizer is -0.16, which indicates that the allocation of Urea fertilizer use is inefficient because the NPMxi/Pxi value is <1 So that maximum profits or efficiency points can be obtained by reducing the use of urea fertilizer in cayenne pepper farming on pump-irrigated land in Pringgabaya District.

4) Variable Allocative Efficiency of Phonska NPK Fertilizer (X4).

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigated land in Pringgabaya District, it is known that the NPMxi/Pxi value of Phonska NPK fertilizer is -9.72, which indicates that the allocation of use of Phonska NPK fertilizer is inefficient because the NPMxi/Pxi value < 1. So that maximum profits or efficiency points can be obtained by reducing the use of Phonska NPK fertilizer in cayenne pepper farming on pump-irrigated land in Pringgabaya District. The inefficiency of both fertilizer uses is in accordance with research by Tina Sonia et al (2020) which states that the NPM/BKM value of chemical fertilizer production factors is less than one, which indicates that the use of seed production factors is inefficient, meaning that the costs incurred for chemical fertilizers are greater than the additional income. obtained so the amount needs to be reduced so that the costs are not too high.

5) Variable Allocative Efficiency of Antracol Pesticide (X5)

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value of Antracol pesticide is 7.48, which indicates that the allocation of use of Antracol pesticide is not yet efficient because the NPMxi/Pxi value is > 1 So the use of Antracol pesticide can still be increased, but by increasing the amount of Antracol pesticide in smaller quantities until it reaches the point of maximum efficiency or profit.

6) Allocative Efficiency of Prevathon Pesticide Variables (X6)

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value of Prevathon pesticides is -21.75, which indicates that the allocation of Prevathon pesticide use is inefficient because the NPMxi/Pxi value is < 1. So that maximum profits or efficiency points can be obtained by reducing the use of Prevathon pesticide in cayenne pepper farming on pump-irrigated land in Pringgabaya District. This is in accordance with research by Larasati (2022) which states that inefficiencies in terms of price in the use of pesticides can be caused by the price of pesticides being quite expensive. Apart from that, this problem is because the need for pesticides is not yet proportional to production.

7) Variable Allocative Efficiency of the Amount of Water Used

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value for the amount of water used is 0.00, which indicates that the allocation of pump irrigation water use is inefficient due to the NPMxi/Pxi value. Pxi < 1. So that maximum profits or efficiency points can be obtained by reducing the use of irrigation water from the pump. This is in accordance with research by Herni Yulita and Halimatus Sa'diyah on groundwater irrigation land (2023) which states that water use is inefficient because NPMxi/Pxi < 1, which means water use needs to be reduced.

8) Variable Allocative Efficiency of Labor

Based on the results of the analysis of the allocative efficiency of input use in cayenne pepper farming on pump water irrigation land in Pringgabaya District, it is known that the NPMxi/Pxi value of Labor is -0.01, which indicates that the allocation of use of Labor is inefficient because the NPMxi/Pxi value is < 1. So that maximum profits or efficiency points can be obtained by reducing the use of labor. This is in accordance with research by Muhammad Yusuf and Dudi Septiadi (2024) which states that the use of labor input shows an efficiency value of -0.22 or this figure is <1, which means that the use of labor input is inefficient.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the research results and discussions described previously, the following conclusions can be drawn:

1) Based on the results of the cost and income analysis of cayenne pepper farming on pumped water irrigation land in Pringgabaya District, it can be concluded that the average production costs incurred are IDR 18,897,381/LLG or IDR 39,924,043/Ha. Meanwhile, farmers' income is IDR 26,148,786/LLG or IDR 55,243,914/Ha.

2) Based on the results of the efficiency analysis of input use, it is stated that the production factors for the area of cultivated land, the number of seeds and the use of the Antracol pesticide have an efficiency value (NPMxi/Pxi) > 1, which means it is not yet efficient so its use can still be increased further. Meanwhile, Urea fertilizer, NPK Phonska fertilizer, Prevathon

pesticide, the amount of water used, and the use of labor have an efficiency value (NPMxi/Pxi) < 1, which means it is not efficient, so its use needs to be reduced.

Suggestions

Based on the results of the research and discussion, the following suggestions can be made:

1) Farmers are advised not to use excessive fertilizer so that land productivity does not decrease. Based on the data, the use of Urea and Phonska fertilizers is in accordance with recommendations so there is no need for additional use of either Urea or Phonska fertilizers. Even though the addition of urea fertilizer can increase the amount of cayenne pepper production, its use should only be increased slightly so that the land does not become saturated. Apart from using fertilizer, you also need to pay attention to the use of water so that you don't use too much water. Then, distribution agents should be able to provide fertilizer on time, in the right quantity and in the right quality.

2) Further researchers are advised to increase the number of samples with the same number of variables or reduce the number of variables so that there is more variation in the data so that variables that were previously insignificant can become significant according to the facts in the field. Apart from that, we also pay attention to the data obtained from respondent farmers, whether it is truly appropriate for use or not.

REFERENCES

[1] Adhiana, et al. 2022. Analysis of Technical Efficiency of Red Chili Farming in Sawang District, North Aceh Regency Using the Stochastic Frontier Approach. *Journal of Scientific Community Thought with an Agribusiness Insight.* 8(1).

[2] Agustina, Riska Melati., et al. 2023. Technical Efficiency Analysis of Cayenne Pepper (Capsicum Frustescens) Farming in Ngantru Village, Ngantang District, Malang Regency. *Journal of Agricultural Economics and Agribusiness (JEPA)* Vol. 7, no. 3.

[3] Ardiansyah., et al. 2023. Data Collection Techniques and Scientific Educational Research Instruments in Qualitative and Quantitative Approaches. *Journal of Islamic Education.* Vol. 1, No. 2.

[4] Arifin, Zaenal. 2020. Educational Research Methodology. *Journal of Educational, Educational and Social Media.* Vol. 1, No. 1.

[5] Ariska, Maya., et al. 2020. Leverage, Company Size and Profitability and Their Influence on Tax Avoidance in Mining Sector Companies on the Indonesian Stock Exchange 2014-2019. *Revenue Journal.* Vol. 1, No. 1.

[6] Bakari, Yuliana. 2019. Analysis of Cost and Income Characteristics of Rice Farming. *Journal of Agricultural Socioeconomics.* Vol. 15, no. 3.

[7] Balaka, Muh. Yani. 2022. *Quantitative Research Methodology.* Publisher: Widina Bhakti Persada. Bandung.

[8] Central Bureau of Statistics. 2015. Publisher: BPS West Nusa Tenggara Province.

[9] Central Bureau of Statistics. 2022. Publisher: BPS Pringgabaya District.

[10] Dewi, Agustina Rosarinda YT, et al. 2018. Analysis of the technical and economic efficiency of using production factors in hybrid corn farming in the Sidomulyo 01 Farming Group, Sukolilo District, Pati Regency. *Journal of Agricultural Sciences.* Vol. 2, no. 1.

[11] Fadlillah, Ummi, et al. 2016. Economic Efficiency of Sugarcane Farming in Dawe District, Kudus Regency. *Journal of Social Welfare.* Vol. 3, no. 1.

[12] Febriyana, Nova Dwi., et al. 2023. Efficiency Analysis of Cayenne Pepper Farming (Case Study of Karangnangka Village, Rubaru District, Sumenep Regency). *Journal of Agricultural Economics and Agribusiness (JEPA).* Vol. 7, no. 2.

[13] Firmansyah, Deri., and Dede. 2022. General Sampling Techniques in Research Methodology: Literature Review. *Holistic Education Scientific Journal.* Vol. 1, No. 2.

[14] Jono. 2016. Productivity Analysis of the Spiritus Factory Using the Cobb-Douglass Production Function (Case Study at PT XYZ Yogyakarta). *Industrial Spectrum Journal.* Vol. 14, no. 2.

[15] Jufri, Afifah F., et al. 2024. Technical and Financial Feasibility Study of Drip Irrigation on Cayenne Pepper Plants in Dry Land, North Lombok Regency. *Journal Agrimansion* . Vol. 25. No.1.

[16] Maemunah, Nila., et al. 2019. Analysis of the Efficiency of Using Production Factors in Cayenne Pepper Farming in Girikulon Village, Secang District, Magelang Regency. *Agroland Journal.* 26(2).

[17] NTB Provincial Agriculture and Plantation Service. 2018. *East Lombok Regency in Figures 2018.* NTB Province. Mataram.

[18] Nurhayati, Novi., and Sari, Evi Purnama. 2020. Analysis of the Farming Efficiency of Cayenne Pepper (Capsicum frutescens L.) in West Kotawaringin Regency. *STIPER Amuntai Science Journal.* 10(1).

[19] Sa'diyah, H. 2023. Optimal farming model on dry land irrigated with groundwater in East Lombok Regency. *Agroteksos Journal*. Vol.33 No.1.

[20] Saputra, I Made Alit Dharma., and Wenagama, I Wayan. 2019. Efficiency Analysis of Red Chili Farming Production Factors in Buahan Village, Payangan District, Gianyar Regency. *Journal of Development Economics.* Vol. 8, no. 1.

[21] Saridewi, Larasati Puspita. 2022. Efficiency of Red Chili Farming in Mirit District, Kebumen Regency. *Journal of Agribusiness Science and Rural Development.* Vol.2 No.2.

[22] Sonia, Tina., et al. 2020. Analysis of Allocative Efficiency of Large Red Chili Farming in Sukalaksana Village, Banyuresmi District, Garut Regency. *Journal of Scientific Community Thought with an Agribusiness Insight.* 6 (1)

[23] Yuli, Citra., and Hadayani. 2022. Analysis of the Efficiency of Using Production Inputs for Cayenne Pepper Farming in Maku Village, Dolo District, Sigi Regency. *Journal Agrotechbis* . 10(4).

[24] Yulita, Herni., and Sa'diyah, Halimatus. 2023. Analysis of the Economic Efficiency of Corn Farming on Pump Water Irrigation Land in East Lombok Regency. *Journal Agrimansion* . Vol. 24, No. 1.

[25] Yusuf, Muhammad., and Septiadi, Dudi. 2024. Efficient Use of Production Factors in Cayenne Pepper Farming in Sakra District, East Lombok Regency. *Agrita Journal.* Vol. 6, no. 1.