International Journal of Management and Commerce Innovations ISSN 2348-7585 (Online)
Vol. 12, Issue 2, pp: (170-177), Month: October 2024 - March 2025, Available at: www.researchpublish.com

Analysis Of Production Factors That Affect Production And Farmers' Preferences In Tomato Farming In Aikmel Subdistrict, East Lombok Regency

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DOI: https://doi.org/10.5281/zenodo.14614507

Published Date: 08-January-2025

Abstract: **This study aims to: (1) analyze production factors that influence tomato production in Aikmel subdistrict, East Lombok Regency; (2) analyze farmers' preferences in tomato farming in Aikmel subdistrict, East Lombok Regency. The research method used in this research is a quantitative descriptive method. The method used in data collection was a survey technique with interviews guided by a prepared questionnaire. The types of data in this research are qualitative and quantitative data, and the data sources used are primary data and secondary data. The number of respondents was determined using the Slovin formula, resulting in 72 respondents. The results of the study show that: (1) Based on the results of the F test where the calculated F statistic is 182.204 ≥ Ftable 2.353809, which means that all production factor variables (land area, seeds, fertilizer, pesticides and labor) together have a significant effect on tomato production in the Subdistrict Aikmel, East Lombok Regency. The t test results show that the calculated t- statistic of land area (2.904), seeds (2.675), fertilizer (12.147), pesticides (2.339), and labor (4.752) are greater than the t-table (1.668271) which means the variables have a partially significant effect on tomato production. (2) The results of the conjoint analysis of farmers' preferences in tomato farming in Aikmel Subdistrict are that the technology is simple, sufficient capital, profitable prices, decent income, done according to habit and extension is less necessary. The results of the Conjoint analysis show that the attributes that really influence farmers in carrying out tomato farming can be seen based on the order of importance of each attribute where technology has the highest level of importance value of 19.849, then capital with an importance value of 18.520, extension with an importance value of 18.410, culture with the importance value is 16,810, the price with the importance value is 13,605, and the income with the importance value is 12,807.**

Keywords: **production, tomato, preference, farmer.**

I. INTRODUCTION

Horticulture (horticulture) comes from the Latin hortus (garden plants) and culture/colere (cultivation), and can be interpreted as the cultivation of garden plants. Horticulture is one of the sectors that is growing rapidly in Indonesian agriculture. Types of plants cultivated in horticulture include fruit, vegetables, ornamental plants and medicinal plants. [1].Of the various horticultural crop commodities cultivated, one of them is tomatoes. Tomatoes are one of the most popular fruit vegetables by everyone. Tomatoes are very beneficial for the body because they contain vitamins A, B and C as well as minerals which are necessary for growth and health. Tomatoes also contain carbohydrates, protein, fat and calories [2]. Aikmel Subdistrict is one of the tomato production centers in East Lombok Regency. Tomato farming activities are influenced by the production factors used. The use of production factors such as use of resources, land area, labor, fertilizers, pesticides really needs to be considered in production, so that excessive use does not occur which can cause less than optimal production results. Farmers' preferences in running tomato farming also need to be taken into account because in running it there are aspects that become the decision of farmers in running tomato farming. Based on the description above, the problems in this study can be formulated as follows: (1) what are the production factors that influence tomato production in Aikmel Subdistrict, East Lombok Regency; (2) what are farmers' preferences for tomato farming in Aikmel Subdistrict,

East Lombok Regency. The aim of this research is: (1) To analyze production factors that influence tomato production in Aikmel Subdistrict, East Lombok Regency; (2) To analyze farmers' preferences in tomato farming in Aikmel Subdistrict, East Lombok Regency.

II. RESEARCH METHODOLOGY

This research uses quantitative descriptive methods. Quantitative descriptive research is describing, researching and explaining something studied as it is, and drawing conclusions from phenomena that can be observed using numbers [3]. The farmer population is 262 farmers, with an error rate of 10% (0.10), the number of samples, so the number of respondents determined was 72 people. The types of data in this research are qualitative and quantitative data, and the data sources used are primary data and secondary data.

1. Multiple Linear Regression Analysis

Analysis of the influence of production factors such as land area, seeds, fertilizer, pesticides and labor on tomato production using the Cobb Douglas production function. The production function of tomato farming is assumed to have the form Cobb Douglas $Y= \beta 0.X_1^{\beta 1}.X_2^{\beta 2}.X^{3\beta 3}.X_4^{\beta 4}.X_5^{\beta 5}$. e. that it can be processed with SPSS, the above function is converted in Ln form so that it becomes a linear regression model such as the SPSS production function model referred to by [4] as follows:

$LnY= Ln\ \beta_0 + \beta_1 Ln\ X_1 + \beta_2 Ln\ X_2 + \beta_3 Ln\ X_3 + \beta_4 Ln\ X_4 + \beta_5 Ln\ X_5 + \mu.$

information :

Y : Tomato Production (kg)

β0 : Constant or intercept

βi: regression coefficient

X1: Land area (ha)

X2: Seedlings (stem)

X3 : Fertilizer (kg)

X4 : Pesticides (lt)

X5 : Labor (HKO)

e, μ: error terms

To determine the accuracy of the model, the double determination coefficient (R2) is used. Determination analysis is a measure that shows how much variable X contributes to variable Y. This analysis is used to determine the percentage contribution of the influence of independent variables simultaneously to the dependent variable. To determine the accuracy of the model, the coefficient of multiple determination (R2) is used with the formula:

$$R^2 = \frac{JKR}{JKT}$$

Information :

R2= Coefficient of determination

JKR = Sum of Regression Squares

JKT = Total Sum of Squares

The influence of all independent variables together on the dependent variable can be determined using the F test statistic (Overall Test) with the formula:

$$F\ test = \frac{KTR}{KTS}$$

Information :

F = Fisher test (fisher test)

KTR = Middle Squares Regression

KTS = Residual Middle Squares

To determine the effect of the independent variable (X) on the dependent variable (Y) partially use the t-test with the following formula:

$$t\ test = \frac{bi}{S\ bi}$$

Information :

t – count = Test – t (student test)

bi = Regression Coefficient Value of Variable i

S bi = Standard Deviation of the i-th Variable

2. Conjoint Analysis

According to[5], when conducting conjoint analysis, there are several models that can be applied. The basic model for conducting conjoint analysis can be seen in the following equation:

$$U(X) = \sum_{i=1}^{m} . \sum_{j=1}^{li} a_{ij} X_{ij}$$

Information :

U (X) = Utility (use value) total

aij = Utility of the i-th attribute (i = 1, 2, 3, …, m)

i = Number of levels of the i attribute

m = number of attributes available

xij = Dummy variable, value 1 if the j level of the i attribute occurs and 0 if it does not occur

The importance of an attribute, normalized to ensure its relative importance to other attributes is:

$$W_i = \frac{I_i}{\sum_{i=1}^{m} I_i} X\ 100\%$$

Information :

Wi = relative importance level of attribute I to other attributes

Ii = Max (Biij)-min (Bij) for each attribute

III. RESULTS AND DISCUSSION

1. Multiple Linear Regression Analysis

Factors that influence red chili production include land area (X1), seeds (X2), fertilizer (X3), pesticides (X4), labor (X5), on tomato production (Y). The results of multiple linear regression analysis can be seen in Table 1.

Table 1. The Results of Multiple Linier Regression Analysis

Variable Name	**Coefficien**			
		t-statistic	**t table**	**Prob**
Constant	1.116			
land area (X1)	0.119	2.904	1.668271	0.005
seeds (X2)	0.171	2.675	1.668271	0.009
fertilizer (X3)	0.738	12.147	1.668271	0.000
pesticides (X4	0.057	2.339	1.668271	0.022
labor (X5)	0.336	4.752	1.668271	0.000
R	0.966			
R Square	0.932			
Variable Name	**Coefficien**			
F-statistic	182.204			
F- table	2.353809			

a. Coefficient of determination test

Based on the table above, the R square value is 0.932, this shows that production factors which include land area, seeds, fertilizer, pesticides and labor contribute 93.2% to tomato production in Aikmel Subdistrict, East Lombok Regency, while the remainder is 6 .8% is influenced by factors not considered in the model such as weather, climate and management.

b. F test

The simultaneous significance test of the estimated parameters (F test) was used to determine whether all independent variables (land area, seeds, fertilizer, pesticides and labor) together had a real effect on tomato production in Aikmel Subdistrict. This F test is carried out by comparing the calculated F-statistic with the table F value at a certain significance (α). From these results it can be seen that F-statistic (182.204) ≥ F-table (2.353809), this means that land area, seeds, fertilizer, pesticides and labor together have a real effect on tomato production.

c. t- test

in the regression equation of a study, the coefficient value for each independent variable (land area, seeds, fertilizer, pesticides and labor) must be tested one by one.

1. *Land Area (X1)*

   Based on linear regression analysis, the t-statistic value was 2.904. This shows that t-statistic 2.904 ≥ t-table 1.668271, which means there is a real influence from the land area variable. The regression coefficient value is 0.119, which means that if the land area increases by 1% assuming other variables are considered constant then tomato production will increase by 0.119%. These results are in line with [6] and [7] stating that land area has a significant effect on tomato farming production.

2. *Seed (X2*)

   The t-statistic value of 2.675 is greater than t-table 1.668271, so H0 is rejected and H1 is accepted. The significance value of 0.009 is smaller than (α=0.05), this means that the seed variable in tomato farming has a real influence on tomato production results in Aikme Subdistrict with a confidence level of 95%. The regression coefficient value is 0.171, meaning that if seeds increase by 1 percent assuming other variables are considered constant, then tomato production increases by 0.171 percent. The results of this research are in accordance with the opinion of [8] which states that seeds have a real effect on production, indicating that increasing seeds for tomato farming will be expected to increase tomato production.

3. *Fertilizer (X3)*

   The he t-statistic value of the fertilizer variable is 12.147 ≥ t-table of 1.668271, so H0 is rejected and H1 is accepted. The significance value of 0.000 is greater than α (α=0.05), this means that the fertilizer variable on tomato plants has a real influence on tomato production results in Aikmel Subdistrict. The regression coefficient value is 0.738, meaning that if the amount of fertilizer increases by 1 percent assuming other variables are considered constant, then tomato production increases by 0.738 percent. These results are in line with research by [9] [6] which states that fertilizer has a significant effect on tomato production.

4. *Pesticides (X4)*

   The pesticide variable t-statistic value is 2.339 ≥ t-table 1.668271, then H0 is rejected and H1 is accepted. The regression coefficient value is 0.057. The significance value of 0.022 is smaller than α (α=0.05), this means that the pesticide variable on tomato plants has a real influence on tomato production results in Aikmel Subdistrict. The regression coefficient value is 0.057, meaning that if pesticides increase by 1 percent assuming other variables are held constant, then tomato production increases by 0.057 percent. This means that the variable amount of solid pesticide has a real influence on tomato production in Aikmel Subdistrict. These results are in line with [10] which states that the pesticide variable is significant, which means that pesticides have a real effect on tomato production.

5. *Labor (X5)*

   The labor variable has a he t-statistic value of 4.752 ≥ t-table 1.668271, so H0 is rejected and H1 is accepted. The significance value of 0.000 is smaller than α (α=0.05), this means that the variable number of workers has a very real influence on tomato production in Aikmel Subdistrict with a confidence level of 95%. The regression coefficient value

is 0.336, meaning that if labor increases by 1 percent assuming other variables are considered constant, then tomato production increases by 0.336 percent. This is in accordance with the opinion of [8] that labor production factors in tomato farming have a partially significant effect on tomato production.

2. Conjoint Analysis

2.1 Utility Level for Each Attribute

The amount of utility or part-worth for each attribute can be seen from the bar diagram. Part-worth is used to determine the impact on aggregate or individual utility as follows.

Table 2. Utility Value

		Utility Estimate	Std. Error
Technology	Easy	-.302	.236
	Simple	.497	.236
	Complex	-.195	.236
Capital	Small	-.068	.236
	Big	-.369	.236
	Enough	.437	.236
Prices	Stable	-.098	.236
	Fluctuating	-.179	.236
	Profitable	.277	.236
Income	Decent	.164	.236
	not worthy	-.320	.236
	Enough	.157	.236
Culture	hereditary	-.318	.236
	Habit	.446	.236
	Try	-.128	.236
Extension	Required	-.015	.236
	less necessary	.425	.236
	Indispensable	-.410	.236
(*Constant*)		3.397	.167

Source: Primary data processed (2024)

a. Utility at the Technology Attribute Level

The utility of easy, simple and complex technology can be seen in the table 2. Farmers' preferences in choosing tomato farming in the form of technology are attributes that are considered when carrying out tomato farming. Based on the table, respondents chose technology at the simple level with a utility value of 0.497 compared to costs at the easy level with a value of -0.302 and complex with a utility value of -0.195.

Based on the research results shown in Table 2, farmers tend to choose simple agricultural technology for tomato cultivation. This can be seen from the highest estimated utility value in the technology category with a simple level. This means that farmers consider technology at this level to be most useful and appropriate to their needs. On the other hand, technology that is too easy or too difficult is less desirable.

b. Utility at the Capital Attribute Level

Based on Table 2, farmers tend to choose an adequate level of capital to use in tomato farming. This can be seen from the highest utility estimate value in the sufficient capital category, namely 0.437. This means that farmers give the most positive assessment of adequate levels of capital compared to small or large levels of capital.

The positive utility estimate value in the capital category at a sufficient level indicates that tomato farmers in Aikmel Subdistrict consider this level of capital to be the most optimal for achieving their production goals. On the other hand, the utility estimate value in the small capital category (-0.068) shows that farmers are less interested in capital levels that are too low. This could be because capital levels that are too small can limit the use of technology or other production inputs, thereby potentially reducing productivity.

On the other hand, the negative utility estimate value (-0.369) in the large capital category indicates that farmers tend to avoid capital levels that are too large. This negative value indicates that farmers consider too large a level of capital to have higher risks, such as higher production costs, difficulties in managing capital. The results of this research show that farmers prefer capital levels at adequate levels. An adequate level of capital is considered to provide optimal benefits, both in terms of increasing productivity and risk management.

c. Utility at the Sale Price Attribute Level

Based on the results reflected in Table 2, farmers' preferences in choosing tomato farming are strongly influenced by the selling price which is considered profitable. In this case, stable and fluctuating selling prices have a lower influence on farmers' decisions compared to profitable prices.

Farmers are more likely to choose a selling price at a profitable level, which has a utility estimate of 0.277, indicating that prices that provide higher profits are considered more attractive. On the other hand, selling prices at a stable level with a utility estimate of -0.098 and selling prices at a fluctuating level with a utility estimate of -0.179, have lower values, indicating that farmers are less interested in price stability or fluctuating prices. This underlines the importance of stability and profit in determining farming choices, where profitable prices are one of the factors for farmers choosing tomato farming in Aikmel Subdistrict.

d. Utility at the Income Attribute Level

Based on Table 2, farmers tend to choose a reasonable income level for tomato cultivation. This can be seen from the highest utility estimate value in the decent income category, namely 0.168. This means that farmers give the most positive assessment of the level of adequate income compared to the level of income that is sufficient or less than adequate. A positive utility estimate value in the decent income category indicates that farmers consider this level of income to be able to meet their living needs and provide satisfaction with the farming business they carry out.

Furthermore, the utility estimate value in the sufficient income category (0.157) also shows a positive assessment, although slightly lower than the adequate category. This indicates that farmers are still satisfied with a sufficient level of income, but of course they would prefer a higher income level if possible.

On the other hand, the negative utility estimate value (-0.320) in the inadequate income category shows that farmers really avoid income levels that are too low. This negative value indicates that farmers consider the level of income to be insufficient to meet their living needs and does not provide sufficient incentives to continue farming. Overall, this shows that income is a factor in farmers' decisions to choose which commodities to cultivate. Farmers tend to choose commodities that can provide a decent income.

e. Utility at the Cultural Attribute Level

Based on Table 2, farmers tend to choose the cultural level at the habitual level in tomato cultivation in Aikmel Subdistrict. This can be seen from the highest utility estimate value in the habitual culture category of 0.446. This means that farmers give the most positive assessment of the cultivation practices they carry out regularly. A positive utility estimate value in the habitual culture category indicates that farmers feel comfortable and confident with the methods they have implemented.

On the other hand, the utility estimate value in the trying culture category (-0.128) shows that farmers tend to be hesitant to carry out farming with a trying culture. This negative value indicates that farmers are worried about the risk of failure if they try new and untested farming.

The lowest utility estimate value is in the hereditary culture category (-0.318). This shows that farmers do not carry out tomato cultivation practices that have been passed down from previous generations. This could be because the farmer's parents did not cultivate tomatoes but instead cultivated other commodities such as rice and corn. Based on the farmers' experience in running tomato farming, most of them have been growing tomatoes for more than 4 years, which shows that tomato farmers in Aikmel Subdistrict are already used to running tomato farming.

f. *Utility at the Extension Attribute Level*

Based on Table 2, farmers tend to choose a level of extension that is less necessary (with a utility estimate value of 0.425). This indicates that most farmers feel that they do not need much intervention from agricultural extension workers in their tomato cultivation activities. Several factors that influence this preference include experience: farmers who have been growing tomatoes for a long time already have enough experience and knowledge so they feel they don't need much

guidance. Other sources of information: farmers get information about tomato cultivation techniques from other sources, such as fellow farmers. Perceptions of extension workers: some farmers have negative perceptions of extension workers, such as considering extension agents to be less competent or irrelevant to the problems they face.

2.2 (Importance Values)

From the preference results using conjoint analysis, the best combination of attributes from the preference results of tomato farmers in Aikmel Subdistrict are the attributes of culture, income and technology, extension, capital and price. This is because not only is the result of the highest utility value, but it is also in accordance with the field conditions in Aikmel Subdistrict.

Table 3: Importance Value of Each Attribute

Importance Values	
Technology	19,849
Capital	18,520
Price	13,605
Revenue	12,807
Culture	16,810
Extension	18.410

Source: Primary data processed (2024)

From the results of research using conjoint analysis, the level of importance of each attribute, where technology has the highest level of importance value of 19.849, then capital with an importance value of 18.520, extension with an importance value of 18.410, culture with an importance value of 16.810, prices with an importance value amounting to 13,605 and income with an importance value of 12,807.

IV. CONCLUSION

Based on the research that has been conducted, it can be concluded:

1) Based on the results of the F test where the calculated F value is 182.204 ≥ F table 2.353809, which means that all production factor variables (land area, seeds, fertilizer, pesticides and labor) together have a significant effect on tomato production in the Subdistrict Aikmel, East Lombok Regency. The t test results show that the t-statistic of land area (2.904), seeds (2.675), fertilizer (12.147), pesticides (2.339), and labor (4.752) are greater than the t-table (1.668271) which means the variables have a partially significant effect on tomato production.

2) The results of the conjoint analysis of farmers' preferences in tomato farming in Aikmel Subdistrict are that the technology is simple, sufficient capital, profitable prices, decent income, done according to habit and extension is less necessary. The results of the Conjoint analysis show that the attributes that really influence farmers in carrying out tomato farming can be seen based on the order of importance of each attribute where technology has the highest level of importance value of 19.849, then capital with an importance value of 18.520, extension with an importance value of 18.410, culture with the interest value is 16,810, the price with the importance value is 13,605, and the income with the importance value is 12,807.

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