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ANALYSIS OF THE FACTORS THAT INFLUENCE THE DECISION OF CAYENNE PEPPER FARMERS TO ADOPT ORGANIC FERTILIZER IN BONE RAYA DISTRICT

Maiqshal Tilohe[1]
Universitas Negeri Gorontalo, Gorontalo, Indonesia
tilohemaiqshal@gmail.com

Agustinus Moonti[2]
Universitas Negeri Gorontalo, Gorontalo, Indonesia
agustinusmoonti@ung.ac.id

Siti Rahmatia Machieu[3]
Universitas Negeri Gorontalo, Gorontalo, Indonesia
rahmatiamachieu@ung.ac.id

Abstract

The challenge faced by cayenne pepper farmers in Indonesia, especially in poor rural areas, is their high dependence on subsidized chemical fertilizers. One solution introduced through counseling to farmers on the use of organic fertilizers by cayenne pepper farmers, the purpose of this study is to (1) determine the characteristics of organic fertilizer adoption in Bone Raya District and (2) determine the factors that influence organic fertilizer adoption in Bone Raya District. This study was conducted in Bone Raya District, Bone Bolango Regency, Gorontalo Province using a quantitative approach with descriptive analysis research essays used in this study, with a total of 50 cayenne pepper farmers in Bone Raya District as respondents. These results indicate that the level of organic fertilizer adoption by cayenne pepper farmers is less than optimal. This can be seen from the 40% of the total cayenne pepper land in Bone Raya District that applies organic fertilizer.

Keywords: Innovation Adoption, Organic Fertilizer, Chili Peppers, Farmers' Decisions

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INTRODUCTION

Indonesia is a country known for its fertile soil. Most Indonesians utilize this land for agriculture. Since the time of our ancestors, farming has been a part of everyday life. Recently, farming has increasingly become a topic of public discussion and government attention. Organic farming is increasingly attracting public attention, particularly due to growing concerns about the negative impacts of chemical fertilizers and pesticides on human health and the environment (Dayati, 2021).

Organic fertilizers include organic materials such as compost, manure, and other organic waste. Applying organic fertilizers to the soil provides a rich source of nutrients, including nitrogen, phosphorus, potassium, and essential micronutrients. These organic materials help improve soil fertility by increasing nutrient availability and water-holding capacity.(Siregar, 2023)

Horticultural crops have high economic value, so many farmers cultivate yard crops, including vegetables, fruits, and other crops. In general, horticulture encompasses all activities related to the cultivation of plants such as vegetables, fruits, and ornamental plants on land (gardens or fields). Yards can be used to cultivate various types of plants, including fruit and vegetable cultivation. Utilizing yards by growing various types of vegetables can increase nutritional value and food needs. One plant frequently cultivated by the community is cayenne pepper.(Fowo et al., 2023)

Chili peppers are a popular vegetable grown by farmers in several regions in Indonesia. They are not only highly prized for their high price, but also offer numerous health benefits. Chili peppers have a wide adaptability, growing in lowland areas and up to 1,400 meters above sea
level. During the flowering stage, chili peppers are not particularly sensitive to daylight hours. They flower earlier when exposed to high light intensity for extended periods, and the fruit ripening process is also shortened.(Ziaulhaq & Amalia, 2022). As for the opinion(Driantama et al., 2021)stated that cayenne pepper will grow and develop rapidly if planted in optimal conditions, both in terms of climate and soil. Soil suitable for planting.

Chili peppers require loose soil rich in organic humus. To achieve a bountiful harvest, chili peppers require comprehensive and balanced fertilization. Organic fertilizers can increase farmers' production qualitatively and quantitatively, reduce environmental pollution, and sustainably improve soil quality. Continuous use can prevent soil degradation and act to bind primary soil particles to secondary soil particles to form stable aggregates, which in turn

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increases soil porosity in horticultural crops, water retention and supply, and soil breathability and temperature. Organic fertilizers provide carbon compounds that improve soil properties and biology. However, they can complement the use of fertilizers that provide high levels of nutrients but affect plant growth.(Polii et al., 2019)

Despite this, organic fertilizer use in Gorontalo Province remains relatively low. According to data from the Central Statistics Agency (BPS), the percentage of farmers using organic fertilizers is still very small compared to chemical fertilizers, both in terms of the area of land fertilized and the number of farmers using them. This situation suggests that farmers' knowledge and interest in organic fertilizer use still need to be improved through outreach activities, training, and policy support.

The low use of organic fertilizer is influenced by various factors, both internal and external. Economic factors include costs and yields. Social factors relate to the influence of farmer groups and extension workers. Environmental factors relate to farmers' understanding of the effects of chemical fertilizer application. Accessibility factors include the availability and distribution of organic fertilizer. Therefore, it is crucial to examine these factors to develop an appropriate strategy to encourage cayenne pepper farmers in Bone Raya District to switch to organic fertilizer.

The importance of understanding the factors influencing farmers' decisions to adopt organic fertilizers is the basis of this research. This research aims to "Analyze the Factors Influencing the Decision of Chili Pepper Farmers to Adopt Organic Fertilizers in Bone Raya District" in depth to provide a clear picture of the obstacles and opportunities in introducing organic fertilizers to chili pepper farmers, as well as to formulate recommendations that can encourage wider adoption of organic fertilizers among farmers. Thus, it is hoped that the use of organic fertilizers can support more sustainable, efficient, and environmentally friendly chili farming.

LITERATURE REVIEW

Chili peppers are a horticultural commodity with high demand in both domestic and international markets. One such chili variety is the cayenne pepper (Capsicum frutescens L.). Indonesians generally use cayenne peppers as a spice at home. However, cayenne peppers are also used in industrial and pharmaceutical applications, thus demonstrating their potential for business prospects and market opportunities, boosting economic growth in the agricultural sector.(Wardhana et al., 2022)

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Chili peppers, or Capsicum frutescens L., are an important vegetable widely cultivated in Indonesia. Chili peppers contain 4,444 compounds, including capsaicin, carotenoids, ascorbic acid, essential oils, resins, and flavonoids. Chili peppers are often consumed fresh or processed. They are commonly used as an additive and flavoring to enhance the flavor of food and are highly nutritious. Furthermore, chili peppers are frequently used as ingredients in the food and pharmaceutical industries for sauces, chili powder, flavorings, and other products.(Sofiarani & Ambarwati, 2020)

Organic fertilizer is a type of fertilizer made from natural organic materials such as plant residues, animal manure, compost, and other organic materials. This fertilizer is used to provide nutrients to plants and improve the physical and biological properties of the soil.Organic fertilizer has several advantages, including reducing the risk of environmental pollution, increasing soil fertility, and enhancing the sustainability of agricultural systems. However, it's important to note that the use of organic fertilizers must be tailored to soil and plant conditions, with attention paid to dosage and application method. Consult an agricultural expert or experienced farmer for appropriate advice on organic fertilizer use.(Siregar, 2023)

Adoption innovation is essentially a process of changing farmer behavior, namely changes in knowledge (cognitive), attitude (affective), and skills (psychomotor). Adoption is a process of accepting something offered or attempted by another party. Adoption in this case can be said to accept something new that is offered and attempted by another party or extension worker.(Sugiarto & Prayoga, 2023)

RESEARCH METHOD

The population in this study were farmers who had joined farmer groups in Bone Raya sub-district, Bone Bolango Regency. The number of respondents in this study was 50 people. Six to eight people were selected from each village. The total sampling method used was used because all cayenne pepper farmers who were members of farmer groups were used as samples for this study.

The data used in this study are primary and secondary data. Primary data was obtained directly from respondents through interviews with cayenne pepper farmers. Meanwhile, secondary data was obtained from agencies related to cayenne pepper farmers in Bone Raya sub-district, Bone Bolango Regency. The population in this study, the measurement scale used for respondents' questions regarding a research object, the indicators measured using a Likert scale.(Majid

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et al., 2025)with a value range of 1 to 5. The assessment scores in the questionnaire are categorized as follows: strongly agree (5), agree (4), neutral (3,) disagree (2), strongly disagree (1). The average answer score from each respondent obtained through the distribution of the questionnaire is then classified into class intervals for each variable.

This research method uses descriptive analysis and multiple linear regression. Qualitative descriptive analysis is used to inform and explain the variables and characteristics of respondents.Multiple linear regression analysis is a regression model that contains more than one independent variable. Regression analysis is a statistical analysis that explains the relationship between two variables, namely, the dependent variable (Y) and the independent variable (X). Multiple linear regression analysis is a regression model that contains more than one independent variable.(Prasetyo, 2022). Qualitative descriptive is done by processing the questionnaire data by grouping it and then explaining it.

RESULTS AND DISCUSSION

Validity Test

Instrument Validity Test measuring instrument used to assess the instrument's independence. The validity of a measuring instrument describes how valid and valid an instrument is. This definition of independence indicates the accuracy and suitability of the measuring instrument used to assess the variable. A measuring instrument can be considered valid if it is truly relevant and accurately answers the questions about the variable being measured.(Ono, 2020).

Table 3.
Validity Test Results

Variables	Statement	r Count	r Table	Sig.	Information
Economic Factors (X1)	X1.1	1	0.278	0.00	Valid
	X1.2	0.537	0.278	0.00	Valid
	X1.3	0.422	0.278	0.00	Valid
	X1.4	0.323	0.278	0.02	Valid
	X1.5	0.290	0.278	0.04	Valid
Social Factors (X2)	X2.1	0.396	0.278	0.00	Valid
	X2.2	0.301	0.278	0.03	Valid
	X2.3	0.428	0.278	0.00	Valid
	X2.4	0.456	0.278	0.00	Valid

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Education Factor (X3)	X2.5	0.279	0.278	0.04	Valid
	X3.1	0.400	0.278	0.00	Valid
	X3.2	0.304	0.278	0.03	Valid
	X3.3	0.376	0.278	0.00	Valid
	X3.4	0.358	0.278	0.01	Valid
Accessibility Factor (X4)	X4.1	0.314	0.278	0.02	Valid
	X4.2	0.307	0.278	0.03	Valid
	X4.3	0.334	0.278	0.01	Valid
	X4.4	0.283	0.278	0.04	Valid
	X4.5	0.279	0.278	0.05	Valid
	X4.6	0.321	0.278	0.02	Valid
Environmental Factors (X5)	X5.1	0.289	0.278	0.04	Valid
	X5.2	0.400	0.278	0.00	Valid
	X5.3	0.462	0.278	0.00	Valid
	X5.4	0.295	0.278	0.03	Valid
	X5.5	0.290	0.278	0.04	Valid
	X5.6	0.357	0.278	0.01	Valid
Farmers' Decision (Y)	Y.1	0.338	0.278	0.01	Valid
	Y.2	0.374	0.278	0.00	Valid
	Y.3	0.466	0.278	0.00	Valid
	Y.4	0.279	0.278	0.04	Valid

Source: Data processed with SPSS, 2025

Based on the data in the table above, the validity test for a question is considered valid if the calculated r is greater than the table r. The r value is obtained from the rho table, where n = 50 and a significance level of 5%, the r value is 0.278. Therefore, the question used has an r value greater than 0.278, making it valid. It meets the validity test and can be used for research data collection and hypothesis testing.

Reliability Test

A reliability test is a test that assesses the reliability of a measurement instrument. It indicates the consistency of measurement results when repeated on the same symptoms using identical instruments. A measuring instrument is considered consistent if it produces similar results even when measured repeatedly (Amanda et al., 2019).

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Table 4.
Reliability Test Results

Variables	Reliability Statistics	
	Cronbach's Alpha	N of Items
Economic Factors (x1)	0.681	5
Social Factors (x2)	0.715	5
Education Factor (x3)	0.797	4
Accessibility Factor (x4)	0.863	6
Environmental Factors (x5)	0.761	6
Farmer's Decision (Y)	0.692	4

Source: Data processed with SPSS, 2025

Based on the results of the table above, the analysis using the Cronbach's Alpha technique as explained in the table above, the reliability coefficient value is 0.681 for the environmental factor variable, 0.715 for the social factor variable, 0.797 for the education factor variable, 0.863 for the accessibility factor variable, 0.761 for the environmental factor variable, and 0.692 for the farmer's decision variable. The Cronbach's alpha coefficient value is greater than the predetermined benchmark value of 0.6. This indicates that the instrument in this study can be carried out and used for this study.

Coefficient TestTo determine how much the independent variable contributes to explaining the dependent variable, the coefficient of determination (R2) test is used. The following table shows the results of the determination test obtained in this study:

Table 5.
Results of the Determination Coefficient Test

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.802a	.644	.603	1,308

a. Predictors: (Constant), TotalX5, TotalX4, TotalX1, TotalX2, TotalX3

Source: Data processed with SPSS, 2025

Based on the table above, it can be seen that the coefficient of determination (R2) is 0.644 or 64.4%. This value indicates that farmers' decisions to adopt organic fertilizer can be influenced by economic factors (X1), social factors (X2), education factors (X3), accessibility factors (X4), and environmental

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factors (X5). The remaining 35.6% is influenced by other independent variables not studied.

F Test (Simultaneous)

The F-test is conducted to determine whether the independent variables collectively have a significant effect on the dependent variable. The following is the F-test table obtained in this study:

Table 6.
F Test

ANOVA

Model		Sum of Squares	df	Mean Square	F	sig
1	Regression	135,947	5	27,189	15,893	.000b
	Residual	75,273	44	1,711		
	Total	211,220	49			

a. Dependent variable: total Y
b. Predictors: (Constant), totalX5, totalX4, totalX1, totalX2, totalX3

Source: Data processed with SPSS, 2025

Based on the table above, the ANOVA analysis on the multiple regression model obtained a calculated F value of 15,893 with a significance of 0.000. Because the significance value in the simultaneous test shows a value smaller than the significance level of 0.05, it can be concluded that the independent variables consisting of economic factors (X1), social factors (X2), education factors (X3), accessibility factors (X4), environmental factors (X5) simultaneously have a significant effect on the decision of cayenne pepper farmers in adopting organic fertilizer.

T-Test (Partial)

The T-test is used to determine whether each independent variable has a significant partial effect on the dependent variable. The following are the results of the T-test in this study:

Table 7.
T-test

Coefficients[a]

	Unstandardized	Coefficients	Standardized Coefficients

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Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	4,565	2,022		2,258	.029
	FE	-.129	.133	-.124	-.968	.339
	FS	.219	.127	.235	1,723	.092
	FP	.199	.095	.294	2,100	.041
	FA	-014	.066	-027	-212	.833
	FL	.313	.084	.496	3,744	.001

a. Dependent Variable: Farmer's Decision

Source: Data processed with SPSS, 2025

The influence of economic factors on farmers' decisions to adopt organic fertilizers

From the research results, the economic factor variable has a calculated t of -0.968 while the t table is 2.01537, so the calculated t is smaller than the t table (-0.968 < 2.01537) and the significance level is 0.339 or greater than 0.05. The coefficient value for the Economic Factor variable is -0.129. Therefore, it can be concluded that Economic Factors do not significantly influence farmers' decisions to adopt organic fertilizers. This means that although farmers consider the costs or benefits of using organic fertilizers, they are not strong enough to significantly influence their decisions. This is based on(Suryono et al., 2025)The cost efficiency variable had no significant effect on farmers' perceptions of organic and inorganic fertilizer use. Farmers who use organic fertilizers produce or make fertilizer using livestock manure, thus reducing fertilizer costs. This is not a consistent practice; sometimes, farmers cannot provide organic fertilizer sustainably because the availability of fertilizer is sometimes insufficient to meet land needs, requiring them to purchase fertilizer from other livestock farmers.

The influence of social factors on farmers' decisions to adopt organic fertilizers

The results of the study show that the social factor variable has a calculated t value of 1.723, while the t table value is 2.01537, so the calculated t value is smaller than the t table value (1.723 < 2.01537), and the significance level is 0.092 or greater than 0.05. The coefficient value for the social factor variable is 0.219, so it can be concluded that social factors do not have a significant effect on farmers' decisions in adopting organic fertilizers. Although the coefficient indicates a positive relationship, assessing its significance is still greater than 0.05. Thus, although the value is close to the significance limit. This shows that the influence of the social environment, such as neighbors or farmer groups, is not strong enough to influence farmers' decisions to use organic fertilizers. because farmers

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in Bone Raya sub-district have more considerations in adopting organic fertilizers, one of which is the technical way to use organic fertilizers, and the decision to use fertilizers is more individual. This is in accordance with research (Wahyudyanti et al., 2023), the variable of social environmental influence partially has no significant effect on the level of adoption of farmer innovation in using liquid organic fertilizer nitrobacter.

The influence of educational factors on farmers' decisions to adopt organic fertilizers

The results of this study show that the education factor variable has a calculated t value of 2,100, while the table t value is2.01537 then the calculated t value is greater than the t table (2,100 >2.01537) and the significance level is0.041 and less than 0.05, the coefficient value for the education factor variable is 0.199, thus it can be concluded that the education factor significantly influences farmers' decisions to adopt organic fertilizer. The higher the farmer's education level, the more likely they are to understand the benefits of organic fertilizer and adopt it in their farming practices. This is in accordance with research (Romadi Ugik, Firman Adiyanto, 2023), the influence between the level of education and the level of innovation adoption is because the higher a person's formal education, the more their insight will influence their decision-making to adopt an innovation based on the knowledge they have.

The influence of accessibility factors on farmers' decisions to adopt organic fertilizers

From the results of this study, the accessibility factor variable has a calculated t value of -0.212 while the t table value is 2.01537, so the calculated t value is smaller than the t table value (-0.212 <2.01537) and the significance level is 0.833 or greater than 0.05, the coefficient value for the accessibility variable is -0.014 and, so it can be concluded that the Accessibility Factor does not have a significant effect on farmer decisions. This shows that the availability of organic fertilizer, distance to the source, or ease of obtaining information has not been a major consideration for farmers in making decisions. However, in this study in the Bone Raya sub-district, farmers still have limited market access and distribution of organic fertilizer, which is still difficult to obtain in farmer shops, and also the price of organic fertilizer is higher.

The influence of environmental factors on farmers' decisions to adopt organic fertilizers

From the results of this study, the environmental factor variable has a calculated t value of 3.744 while the t table value is 2.01537, so the calculated t

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value is greater than the t table value (3.744> 2.01537) and the significance level is 0.001 or less than 0.05, the coefficient value on the environmental factor variable is 0.313 and it can be concluded that environmental factors have a significant effect on farmers' decisions in adopting organic fertilizers. This shows that the higher the awareness of farmers regarding the importance of protecting the environment, maintaining the quality of soil, air, and water, the greater the possibility that they will switch to organic fertilizers.

CONCLUSION

Based on the results of research on the factors influencing cayenne pepper farmers' decisions to adopt organic fertilizer in Bone Raya District, it can be concluded that education and environmental variables have a significant influence on farmers' decisions. A higher level of education allows farmers to have a better understanding of the benefits of organic fertilizer, thereby increasing their tendency to adopt it. Similarly, high environmental awareness encourages farmers to switch from chemical fertilizers to organic fertilizers as an effort to maintain the sustainability of the agricultural ecosystem. Meanwhile, economic, social, and accessibility variables did not show a significant influence, indicating that these factors are not yet primary considerations for farmers in making decisions about using organic fertilizer. Simultaneously, the five factors analyzed were able to explain 64.4% of the variation in farmers' decisions, while the remainder was influenced by other factors outside this study.

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