



The Influence of Socio-Economic Factors on Farmers' Decision to Use Fertilization Technology in Paddy Rice Cultivation in Langgomea Village, Uepai District, Konawe Regency

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Abstract

This study aims to: (1) to determine the influence of socio-economic factors (age, education level, number of family dependents, farming experience, land area and labor) on farmers' decisions to use Mist Blower fertilization technology and without Mist Blower in Langgomea Village, Uepai District, Konawe. The number of samples in this study were 60 people, Determination of samples in this study using the census method, The number of farmers who used Mist Blower was 28 farmers while those who did not use Mist Blower were 32 farmers. The method used is descriptive statistics and logistic regression analysis. The results of this study are socio-economic factors that influence the decisions of wet-rice farmers in using Mist Blower fertilization technology, namely the variable level of education and land area, while the variable age, number of family dependents, farming experience and labor do not affect farmers' decisions in using Mist Blower fertilization technology

Keywords: Logistic Regression, Socioeconomics, Rice Paddy Farming Decision, Mist Blower.

INTRODUCTION

The agricultural sector has an important role in providing a source of life for the Indonesian population and is important in economic growth. One of the main focuses of development is on food crops, with the hope that this agricultural sector can contribute significantly to the provision of food, especially rice crops, to meet the needs of the Indonesian people (Helena, 2019).





Rice fields are an agroecosystem that has a significant role in Southeast Sulawesi, especially as the main source of rice production. Rice itself is one of the national food commodities that has become the staple food for most Indonesians (Dewi, *et al.*, 2007). Rice has a critical role as a staple food for the Indonesian population, making it a strategic commodity even in a political context. This is done to prevent hunger and avoid potential economic and political turmoil (Valerlana and Saptana, 2010).

Food crop agricultural development in Konawe District plays a very important role, not only in increasing production to ensure food availability for the local population and creating jobs, but also as a potential source of income. This effort can contribute significantly to increasing income for food crop farming households, with an eventual impact on improving the welfare of the people of Konawe District.

Langgomea Village, located in Uepai Sub-district, Konawe District, where most of the population earns their livelihoods as wet-rice farmers. The area of wet-rice land in this village reaches 73 hectares. Some farmers in Langgomea Village have adopted fertilization technology as part of their farming activities. One of the fertilizer technology tools used by farmers in this village is the *Mist Blower*. But farmers in Langgomea Village have not fully used *Mist Blower* technology because each farmer in Langgomea Village has different socioeconomic factors that can influence their decision to apply the technology.

Mist Blower is considered as one of the agricultural mechanism tools that has significant value, because it can help facilitate human work in spreading fertilizers and pesticides evenly (Ahmad, 2012). Although the socio-economic conditions of the community have an important role in increasing agricultural yields, especially through the utilization of fertilization technology such as *Mist Blowers*, there are still many farmers who have not adopted this technology in their farming practices.

According to Mbina (2016), the socioeconomic status of individuals varies, leading to variations in attitudes and decisions, including in the adoption of agricultural technologies. Factors such as occupation, education, income, and social interaction play an important role in shaping farmers' decisions, especially in adopting agricultural technology for wet-rice farming. Farmers with stable economic conditions are more capable of adopting modern technologies, while economic and educational limitations become barriers. In addition, cultural factors and interactions with fellow farmers also influence the decision. Rice paddy farming technologies, which include innovations such as improved rice varieties, efficient irrigation, proper fertilizer use and modern pest control, depend on farmers' ability to access and apply these technologies.

It is important to understand that each farmer has different socio-economic factors that



can influence their decisions regarding the use of fertilization technology, such as *Mist Blowers*. This can be seen from the inadequate economic conditions among farmers. Most farmers in Langgomea Village have not fully used *Mist Blower* fertilization technology. Therefore, researchers are interested in conducting research with the title "The Influence of Socio-Economic Factors on Farmers' Decisions to Use Fertilization Technology in Paddy Rice Cultivation in Langgomea Village, Uepai District, Konawe Regency". This research is expected to provide deeper insight into the factors that influence farmers' decisions regarding the use of fertilization technology in paddy rice farming in Langgomea Village.

METHOD

The population in this study were all farmers who cultivated shallot farmers. The population in this study were all wet-rice farmers in Langgomea Village as many as 60 farmers. Determination of samples in this study using the cluster census method, where all populations are sampled. The number of farmers who use *Mist Blower* technology is 28 farmers while those who do not use *Mist Blower* technology are 32 farmers. The types of data and data sources in this study are primary data and secondary data. Data collection techniques were carried out by observation and interviews. The data were then analyzed using descriptive statistical analysis techniques and logistic regression analysis with quantitative data processed using Microsoft excel and SPSS software. Homster and Lemeshow (2000) formulated the logit equation model as follows:

$$g(x) = \ln \left[\frac{p(x)}{1 - p(x)} \right]$$

$$g(x) = \beta + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$$

Description:

$g(x)$ = The probability that a farmer makes a decision to use a *Mist Blower* (1, for farmers who use *Mist Blower* technology and 0, for farmers who do not use *Mist Blowers*).

X_1 = Age of respondent (years)

X_2 = Level of education (years)

X_3 = Number of family dependents (people)

X_4 = Farming experience (years)

X_5 = Land area (ha)

X_6 = Labor (HKP)

β = Constant

$\beta_1 \dots \beta_6$ = Estimated coefficient of the independent variable



1. *G-test (Likelihood Ration)*, estimation of capital suitability is carried out to determine whether the dugan model used is significant or not significant. The maximum likelihood estimator method is used.
H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, where none of the independent variables has an effect on the dependent variable.
H1: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 \neq 0$, at least one independent variable affects the dependent variable.
Sig. > 0.5; reject H1, accept H0
Sig. $\leq$ 0.5; accept H1, reject H0
2. *Goodness of Fit Test*, if the statistical value of the *Hosmer and Lemeshow Goodness of Fit Test* is equal to or less than 0.5, it means that there is a significant difference between the model and its observation value, so that the *Goodness Fit* model cannot predict its observation value. If the statistical value of the *Hosmer and Lemeshow Goodness of Fit Test* is greater than 0.5, it means that the model is able to predict its observation value or it can be said that the model is acceptable because it matches the two observations.
3. The coefficient of determination (*Nagelkerke R Square*) is a modification of *Cox and Snell's R Square* coefficient to ensure that the value varies from 0 to 1 A small value means that the ability of the independent variables to run the dependent variable is very limited. A value close to one means that the independent variables provide almost all the information needed to predict the variation in the dependent variable.
4. *Wald test*, the hypothesis in the wald test is rejected if $G^2 > X^2(\alpha, p)$ or $p\text{-value} < \alpha$, which means that the independent variable X_j partially affects the independent variable Y .
The hypothesis for the Wald test is as follows:
 - If the significant value of $W < 0.1$, then the independent variable partially has a significant effect on the dependent variable.
 - If the significant value of $W > 0.1$ then the independent variable partially has no significant effect on the dependent variable.
5. Coefficient interpretation for logistic regression models can be done by looking at the odds ratio value. Odds ratio is an interpretation of odds that can be interpreted as the ratio of the chance of a successful event to an unsuccessful event of the response variable. If an explanatory change has a positive coefficient sign, the odds ratio will be greater than one. Conversely, if the coefficient sign is negative, the odds ratio will be less than one.



RESULTS AND DISCUSSION

Socioeconomic Characteristics of Rice Paddy Farmers

The socio-economic characteristics of respondent farmers reflect the circumstances and diversity in farming which include age, education level, number of family dependents, farming experience, land area, labor, production costs, and production yields. This research analyzes data using descriptive statistical methods, which present data based on reality in the field. The conditions of wet-rice farmers who use and do not use Mist Blowers in Langgomea Village are presented in Table 1, to show the comparison in these aspects.

Table 1 Descriptive Statistics of Respondent Characteristics of Rice Paddy Farmers in Langgomea Village, Uepai District, Konawe Regency

No.	Variables	<i>Mist Blower Fertilization Method</i>					
		Yes			No		
		Average	Min.	Max.	Average	Min.	Max.
1	Age (year)	42	32	53	50	34	70
2	Education (years)	11	9	12	7	0	12
3	Dependents (people)	3	1	5	3	1	5
4	Experience (years)	16	5	37	19,7	12	45
5	Land Area (ha)	1,5	0,55	2,7	0,7	0,15	1,2
6	Labor (HKP/ha)	2,5	0,0	9,0	3,6	1	11,2
7	Production Cost (IDR/ha)	40.988.396	16.742.834	80.915.024	25.113.318	15.632.500	42.334.667
8	Results Production (kg/ha)	7,658	90	31,90	7,054	4.125	9,763

Source: Primary Data, Processed (2024)

Based on table 1 above, it can be explained that;

1. The average production cost per hectare of paddy rice using *Mist Blower* is higher at Rp40,988,396,/ha compared to paddy rice production that does not use *Mist Blower* which reaches Rp25,113,318,/ha. The difference in the amount of production costs is due to the fact that the land of farmers who do not use *Mist Blower* is narrower than those who use *Mist Blower*.
2. That the average production per hectare of paddy rice using the *Mist Blower* is higher at 7,658 kg/ha compared to paddy rice production that does not use the *Mist Blower* only 7,054 kg/ha. This shows that the production of farmers who use *Mist Blower* is higher than those who do not use *Mist Blower*.

Table 2 Respondent Variables of Rice Paddy Farmers in Langgomea Village, Uepai District, Konawe Regency

Variables	Category	<i>Mist Blower</i> Fertilization Method			
		Yes		No	
		n	%	n	%
Age	15-55 (productive)	28	100	23	72,0
	>55 (less productive)	-		9	28,0
Education	Not in School	-	-	6	18,7
	Not graduated from elementary school	-	-	-	-
	SD	-	-	10	31,2
	Not graduated from junior high school	-	-	4	12,5
	SMP	3	10,7	5	15,7
	Not graduated from high school	4	14,3	-	-
	SMA/SMK	21	75	7	21,9
Number of Dependents	1-3	17	60,7	13	40,6
	4-5	11	39,3	19	59,4
	>6	-	-	-	-
Farming Experience	Less Experienced (<5)	-	-	-	-
	Moderately Experienced (5-10)	6	21,4	-	-
	Experienced (>10)	22	78,6	32	100
Land Area	<0,4	-	-	4	12,5

	0,4 - 1,8	17	61	28	87,5
	>1,8	11	39	-	

Source: Primary Data, Processed (2024)

Based on table 2 above, it can be explained as follows;

1. That all respondents of paddy rice farmers who use *Mist Blower* are classified as productive age, namely 100% (28 people), while respondents of paddy rice farmers who do not use *Mist Blower* are mostly classified as productive age, namely 72% (32 people). One indicator in determining work productivity in business development is the age level, where the age of farmers who are relatively easy to work stronger, dexterous, and easily accept new innovations, responses to the surrounding environment when compared to farmers who have a relatively old age often reject new innovations (Sekartawi, 2001).
2. The education level of respondent farmers in Langgomea Village has variations in their final education, ranging from elementary, junior high, high school and even some who did not go to school. The number of farmers who do not use *Mist Blower* is most at the elementary school education level with a percentage of 31.2% and farmers who use *Mist Blower* at the high school education level with a percentage of 75%. This can be interpreted that farmers must also be educated in order to increase their knowledge so that they can increase the productivity of their paddy harvest and be able to consider and analyze new technology to be applied. A person's level of education can change the mindset, better reasoning power, so that the longer a person knows education will be more rational. In general, highly educated farmers will have a better way of thinking, allowing them to act more rationally in managing their farms (Assegaf, 2007).
3. That the number of family households of respondents of rice paddy farmers who use *Mist Blower* is classified as a small family category (1-3), namely 60.7% (17 people). While respondents of rice paddy farmers who do not use *Mist Blower* belong to the medium category (4-5), namely 59.4% (19 people). This shows that the amount of costs incurred for daily needs depends on the number of family members who are dependent. The number of family dependents so, it is expected that the need for labor to manage the farm can be obtained from within the household, with the availability of sufficient labor in one household then in one farming activity does not require the rental of labor from outside the family.
4. That most of the respondents of wetland rice farmers who use *Mist Blower* are classified as experienced farmers who are productive at 78.8% (22 people). While respondents of

rice paddy farmers who did not use *Mist Blower* were all classified as experienced farmers, namely 100% (32 people). This indicates that the experience of farmers on rice paddy farming is very good because the experience of farming will provide motivation to farmers to correct or evaluate themselves about their farms.

5. That most of the respondents of rice paddy farmers who use *Mist Blower* have a land area of 0.4 - 1.8 ha, namely 61% (17 people) and farmers with a land area of > 1.8 39% (11 people). While the respondents of rice paddy farmers who did not use *Mist Blower* mostly also had a land area of <0.4 12.5% (4 people) and farmers with a land area of 0.4 - 1.8 ha which amounted to 87.5% (28 people). Rice paddy farmers who use *Mist Blowers* and those who do not use *Mist Blowers* on average have a medium land area, based on the categorization of the research sample data.
6. The average amount of labor required per hectare for farmers who use *Mist Blowers* is 2.5 HKP during the fertilization period. The average amount of labor needed per hectare for those who do not use a *Mist Blower* is 3.6 HKP during the fertilization period. So it can be seen that the amount of labor needed during the fertilization period that does not use a *Mist Blower* is more than the amount of labor needed in fertilizing using a *Mist Blower*. The explanation above shows that farmers who do not use *Mist Blowers* are farms that need additional labor.

Socioeconomic Factors Influencing Rice Paddy Farmers' Decision to Use Fertilizer Technology

Testing the hypothesis to find out the factors that influence the decision of wetland rice farmers in the use of *Mist Blower* technology is done using logistic regression analysis. First, the feasibility of the logistic regression model was tested by looking at the *Hosmer and Lemeshow* value to determine the suitability of the model and the *Nagelker R Square* value to measure the goodness of the model, then test the entire model by looking at the *Likelihood Ratio*, after which a partial test was carried out to interpret the coefficient.

The variables used at the beginning of data processing were age, education level, number of family dependents, farming experience, land area, labor production costs and production yield. After the model fit test was conducted and it turned out that the model tested was not suitable ($-2\text{LogL value} = 0.000 \neq > \alpha$), the model was adjusted. If the hypothesized model has not achieved a suitable model, then model respecification can be carried out to achieve a good estimation value. Model respecification is done by modifying the logit model. This is in line with research conducted by Kasanah (2015) in modifying the model there are several ways that can be done, namely: (1) deleting observed variables that do not meet the requirements of good validity and

reliability, and (2) utilizing the information contained in the *modification indices*, namely (a) adding new paths between observed variables and *latent* variables and between latent variables, and (b) adding error covariance between two error variances.

Assessing the Goodness Of Fit of the Model

This test can be done by looking at the SPSS output results of the *Hosmer and Lemeshow Test* and *Nagelkerke R Square* sections. To assess the feasibility of the model, this study tested the *Hosmer and Lemeshow test*, the *Overall Model Fit Test*, and the following test analysis;

Table 3 Estimated Logistic Parameters

Hosmer and Lemeshow Test	Step	Chi-square	df	Sig.
	1	0,728	8	0,999
Nagelkerke R Square	Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
	1	15,272	0,676	0,903
Overall Model Fit Test	Step		Chi-square	df
	1	Step	67,639	6
		Block	67,639	6
		Model	67,639	6
Analysis Test	Step		B	S.E.
	1	X1 (age)	-0,038	0,102
		X2 (education)	1,134	0,591
		X3 (dependents)	-0,708	0,542
		X4 (experience)	-0,230	0,316
		X5 (land area)	6,558	3,331
		X6 (labor)	0,935	0,569

Source: SPSS Data Processing Results (2024)

Based on table 3 above, it can be explained as follows;

1. The *Hosmer and Lemeshow Test* is used to determine the suitability of the model. If the Hosmer and Lemeshow Test value ≤ 0.1 then the model used is not in accordance with the hypothesis and if the Hosmer and Lemeshow Test value in the output ≥ 0.1 then the model used is in accordance with the hypothesis. The SPSS output display shows that the Hosmer and Lemeshow statistical value is 0.728 with a significance probability of 0.999 (Sig > 0.1),



so the logistic regression model used is appropriate and acceptable because there is no significant difference between the model and the hypothesis that has been made.

2. *Nagelkerke R Square* (R^2) is used to measure the goodness or closeness of the relationship between the dependent and independent variables. The coefficient of determination (*Nagelkerke R Square*) value is 0.903. This value shows the strength of the model used in the study. The higher the *R Square* value, the better and more qualified the advice given. This value can be interpreted that the variation of the dependent variable (farmers' decision to use *Mist Blower* fertilization technology) can be explained by the independent variables (age, education, number of family dependents, farming experience, land area and labor) 89.9% while the remaining 10.1% is explained by other variables not included in this study.
3. Assessing the overall model or testing the significance level of the logistic regression model is done using the *likelihood ratio* test (G-test). Based on the results of the analysis, the G_{count} is 67,639 with the largest significance value of 0.000 at the 10% error rate or $\alpha = 0.1$ or 90% confidence level. The significance value of G_{hitung} 0.000 is smaller than the real and used level (0.1), it can be interpreted that age (X_1), education (X_2), number of dependents (X_3), farming experience (X_4), land area (X_5) and labor (X_6). Have a real effect on the dependent variable (Farmers' decision making in using *Mist Blower* fertilization technology). Therefore, the model is stated to fit the data and is used for further analysis.

The results of estimating the regression coefficients using the logistic model of the six independent variables in Table 3 there are two variables that affect the farmer's decision to use *Mist Blower* fertilization technology these variables are education (X_2) and land area (X_5). Variables that do not affect are age (X_1), number of family dependents (X_3), farming experience (X_4) and labor (X_6). From the partial test results above, it states that the model has a significance that is smaller than the real level of 0.1. So that the variables of education and land area have a real effect on farmers' decisions in using *Mist blowers*.

Based on the partial test results above, a logistic regression model can be obtained for farmers who use *Mist Blowers*, which is as follows:

$$g(x) = -7.231 + 1.134x_2 + 6.558x_5$$

- a) Age (X_1), based on the odds ratio value contained in table 3, the chances of a farmer who is productive age has a tendency to use a *Mist Blower* of 0.963 times compared to farmers who have a less productive age. This means that age has no influence on the





- farmer's decision to use a Mist Blower because the less productive the age of a farmer, the more likely they are not to use a *Mist Blower*. This is in line with the research of Wongkar, *et al.* (2016), which states that there is no real relationship between age and adoption of rice cultivation innovations. Because farmers in the old age group are more oriented towards their experience than trying to implement new innovations.
- b) Length of Education (X2), based on the odds ratio value contained in table 3, the chances of a farmer who has a higher level of education has a tendency to use a *Mist Blower* 3.109 times than a farmer who has a low level of education. This means that the length of education has a real influence on the farmer's decision to use a *Mist Blower* because the higher the education of a farmer, it will influence them to use a *Mist Blower*. This is in line with the research of Novita (2015), which states that there is a significant relationship between formal education with socio-economic and cultural characteristics with the level of application of wetland rice farming technology in Sekerman District, Muarjo Jambi Regency with a 95% confidence level.
 - c) Number of Family Dependents (X3), based on the odds ratio value contained in table 3, the chances of a farmer who has a number of family dependents <3 has a tendency to use a *Mist Blower* 0.493 times than a farmer who has a number of family dependents > 4. This means that the number of family dependents has no influence on the farmer's decision to use a *Mist Blower* because the more the number of dependents of the farmer's family, it will influence not to use a *Mist Blower*.
 - d) Farming Experience (X4), based on the odds ratio value contained in table 3, the chances of a farmer who has a fairly experienced farming experience has a tendency to use a *Mist Blower* 0.794 times than farmers who have experienced farming experience. This means that farming experience has no influence on the farmer's decision to use a *Mist Blower* because the longer the farmer's farming experience will affect not to use a *Mist Blower*. This is in line with the research of Musyarofah (2013), which states that there is a real negative influence between the farming experience variable and the application of integrated crop management (PTT) by rice farmers in Ciherang Village, Dramaga District, Bogor Regency, West Java.
 - e) Land Area (X5), based on the odds ratio value found in table 3, the chances of a farmer who has a land area > 1.8 ha has a tendency to use a *Mist Blower* of 3.117 times that of a farmer who has a land area < 1 ha. This means that land area has a real influence on farmers' decisions to use a *Mist Blower* because the more extensive a farmer's land area, the more it will influence them to use a *Mist Blower*. This is in line with Nurhilal's





- research (2013), that the land area factor jointly has a significant effect on the level of adoption of direct seed planting technology in Buntu Barana Village, West Suli District, Luwu Regency. Likewise with the research of Payong, *et al.* (2018) that the land area factor has a significant effect on the adoption of the jajar legowo system.
- f) Labor (X6), based on the odds ratio value contained in table 3, the chances of a farmer who has a workforce of 2.5 HKP has a tendency to use a *Mist Blower* of 0.339 times than a farmer who has a workforce of 3.6 HKP. This means that labor does not have an influence on the farmer's decision to use a *Mist Blower* because the more the number of farm laborers will influence not to use a *Mist Blower*. This is in line with the research of Siregar, *et al.* (2015), which states that the factors that do not influence farmers to use *Mist Blower* are land area, labor use and revenue.

CONCLUSION

Based on the results of research and discussion of the influence of socio-economic factors on farmers' decisions in using fertilization technology in the cultivation of paddy rice in Langgomea Village, Uepai District, Konawe Regency, it can be concluded as follows:

Socio-economic factors that influence the decision of wet-rice farmers in using *Mist Blower* fertilization technology, namely the variable level of education and land area, while the variable age, number of family dependents, farming experience and labor do not affect farmers' decisions in using *Mist Blower* fertilization technology.

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