Local Wisdom of Horticultural Farmers in Adapting and Facing the Obstacles in Climate Change

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ABSTRACT
The effect of climate change on the productivity of horticultural commodities is very large. So that the formulation of the problem taken in this study is: What are the known and experienced climate change phenomena and the obstacles faced by farmers in the horticulture subsector in Probolinggo. What are the adaptation efforts to climate change and the factors that influence adaptation efforts carried out by farmers in the horticulture subsector in Probolinggo. This research was conducted in Ngadisari Village, Sukapura District, Probolinggo Regency. The analytical method used in this research is descriptive analysis with data tabulation, score and coding, and logistic regression method. The results showed that the phenomenon of climate change felt by farmers was the early rainy season, and the intensity of rainfall and the number of rainy days increased. Adaptations that are mostly carried out by farmers to overcome climate change are the use of intensive fertilizers, the use of pest and disease resistant varieties, the use of rain and drought resistant varieties, the use of chemical pesticides, increasing the intensity of weeding, the use of seeds from propagation, planting of reinforcing plants, intercropping/ intercropping. rotation, changes in planting time, application of recommended spacing, handling of crop yields by minimizing weight loss. The obstacles faced by farmers in adapting to climate change are the lack of knowledge and information related to climate change and limited capital. A significant factor influencing farmers' decision in adapting is the broad of the land. The wider the area of land owned by horticultural farmers, the lower the chances of farmers adapting to climate change with a high category of 68.2%.

Keywords: *Climate Change, Farmers, Adaptation, Mitigation, Probolinggo.*

1. INTRODUCTION

One of the natural conditions that pose a threat to humans is climate change. Farmers are one of the most affected by climate change. There are direct and indirect effects on climate change, direct effects (temperature, rainfall, and extreme weather events) while indirect effects such as migration of humans and other species [1]. More effective cooperation between countries is needed in efforts to control climate change. The Indonesian government has committed to reducing emissions through the ratification of the Paris Agreement as outlined in Law No. 16 of 2016. The Paris Agreement requires Indonesia to describe and communicate post-2020 climate resilience actions in the contribution document to climate change which is determined nationally in the Nationally Determined Contribution (NDC). The NDC document is submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC). The NDC document covers aspects of climate change mitigation and adaptation. As adaptation action, Indonesia commit to increase economic resilience, social resilience and livelihoods, as well as ecosystem and landscape resilience as well as conditioning for climate resilience [2].

Adaptation is influenced by many infrastructure and institutional factors as well as human, social, economic and natural resources. The success of adaptation is determined by physical vulnerability and adaptive capacity to climate change. Developing countries are considered to have low adaptive capacity compared to developed countries [3]. The success of adaptation is influenced by the instruments used, the methods applied, the level and quality of community participation, and the

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effectiveness of providing supporting factors such as infrastructure and institutions, as well as the consistency of policies and programs [4].

Ngadisari Village, Probolinggo Regency is one of the highlands in East Java that has received attention in increasing and developing horticultural commodities, one of which is potato. However, Tengger does not have friendly natural conditions due to uncertain climate change. From monitoring station in Pasuruan (nearest station), rain drop in 12 months in 2021. January was the largest rainy days and July, August, and October was the smallest [5]. Through crop simulation results, stated that every increase in temperature of up to 2°C in lowland areas can reduce production by 40%, and in medium and highlands production decreases by about 20% [6]. Research on the adaptation of farmers in the Horticulture sub-sector was conducted to obtain very important information in efforts to deal with climate change. The adaptation strategy carried out by farmers in the Horticulture subsector becomes a reference in formulating an ideal mitigation and adaptation strategy in dealing with climate change.

2. METHOD

This research was conducted in the Bromo Tengger area or more precisely in Ngadisari Village, Sukapura District, Probolinggo Regency. This research was conducted intentionally (purposive method) with the consideration that Ngadisari Village, Sukapura District, Probolinggo Regency (Figure 1) was chosen because of its natural and tourism potential, which is very close to Mount Bromo which is still active.

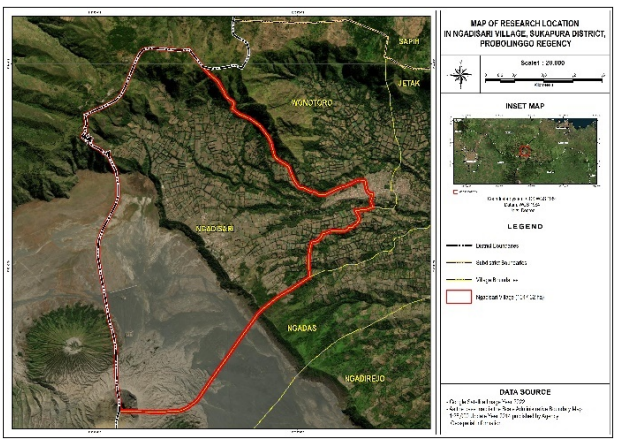

Figure 1 Location of Study Area

The village of Ngadisari is included in the highlands because it has an altitude of 1,800 meters above sea level and has a distance of 80 km from the city center. Ngadisari Village is the highest village and closest to Mount Bromo compared to other villages in Sukapura District. In terms of climatology, Ngadisari village has an average annual rainfall of 3,577 mm and has a daily temperature ranging from 10-20 C°. This village has an area of 775.3 hectares and occupies the 8th position out of 12 villages in Sukapura District which has an area of 10,208.53 hectares. The area of the area is divided into various types of land, namely uses such as fields, public settlements, protected forests, community forests and others. Sukapura District consists of 12 villages including Ngadisari Village. This village is closest to the peak of Mount Bromo and the most southwestern tip of Mount Bromo Sukapura District. The distance from Ngadisari Village to Sukapura District is 15 km and the distance to Probolinggo Regency is about 80 km. The village of Ngadisari is bordered by two villages and even indirectly borders two other regencies/ cities.

A total of 40 farmers used in this study by purposive sampling method. This research uses two types of data, namely primary data and secondary data. Primary data obtained based on interviews using questionnaires. The method used in this research is descriptive method and analytical method. Descriptive method was used to determine the understanding of farmers about climate change, adaptation by farmers to climate change, and the obstacles faced by farmers in adapting to climate change. The analytical method used to analyze the factors that influence farmers' decisions in adapting to climate change is the logistic regression method. The following is the formulation of the logit equation in the logistic regression model:

$$P = Yi = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 D_1 + \beta_6 D_2 + \beta_7 D_3}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 D_1 + \beta_6 D_2 + \beta_7 D_3}} \quad (1)$$

Description:

P = Probability

Yi = Farmer's decision (1 = adapt, 0 = do not adapt)

0 = Constant

1-β10 = Regression coefficient of independent variable

X1 = Age (Years)

X2 = Farming Experience (Years)

X3 = Number of family members (soul)

X4 = Land area (Hectares)

D1 = Education level (1 = undergraduate, 0 = non-graduate)

D2 = Education level (1 = SMA/S MK, 0 = non SMA/SMK)

D3 = Education level (1 = SMP, 0 = non SMP)

3. RESULTS AND DISCUSSIONS

3.1. Climate Change Phenomenon known Horticulture Subsector Farmer in the Ngadisari Village, Sukapura Sub district, Probolinggo District

A total of 40 respondents farmer means of climate change as drought season changing is going to rainy season without doing explanation about the definition and description about climate change . However, there is many farmers once hearing about climate change and feel the existence of climate change phenomenon. Knowledge is possessed by horticulture farmer about climate change that covers phenomenon climate change perceived. Climate change is also interpreted by horticulture farmer as changing of rainfall intensity and earlier rainy season. Horticulture farmer in Ngadisari Village, Sukapura Sub districts, Probolinggo districts conclude that climate change is climate change of this and previous year weather, where climate change impact to horticulture plant cultivation. Climate change condition in the Ngadisari Village where rainy season comes early of October 2021 than the previous. Horticulture farmer also feel the intensity of rainfall and the total of rainy days increasing in recently month which rain could occur all day so that impact to farming carried out. Enhancement pest and disease is worse because of unstable changing of season and rainfall intensity . Whereas drought season at 2021 is shorter than prior.

3.2. Climate Change Adaptation Horticulture Subsector Farmer in the Ngadisari Village, Sukapura Sub Districts, Probolinggo Districts

There is many adaptations was done by horticulture farmer in Ngadisari Village. Most of farmer in Ngadisari village didnt saving input materials although in uncertain climate. It was conducted because of farmer think that when the input materials are reduced have an impact on abnormality of plant growth. Most of the farmer increased their plant productivity through drum fertilizer intensively. resistant varieties from pest and disease. Weeding intensity also was conducted intensively in rainy season to prevent rapid growth of weed. That's handling of Ngadisari Village farmer means to prevent the damage of plant in recently climate change condition. There is many adaptation of horticulture farmer in Ngadisari Village, Sukapura Sub districts, Probolinggo districts. The following is adaptation type of coffee farmer in Ngadisari Village, Sukapura Sub districts, Probolinggo districts (Table 1).

Table 1. Adaptation type of Horticulture Farmer in the Ngadisari Village, Sukapura Sub districts, Probolinggo districts at Climate Change Condition

No.	Adaptation Type	Amount of Farmer (person)	Percentage (%)
1	Savings input usage		
2.	Animal manure intensively	40	100
3.	Pest and diseases resistant varieties	40	100
4.	Wet and drought resistant varieties	40	100
5.	Opposite contour tillage	21	52.5
6.	Cover crop plant or ground cover	0	0
7.	Adequate Irrigation and drainage	0	0
8.	Biological Control pesticide	0	0
9.	Chemical pesticide	40	100
10.	Reduction of chemical input	0	0
11.	Enhancement intensity of weeding	35	87.5
12.	Use seeds from multiplication	38	95
13.	Change timetable of trimming and fertilization	7	17.5
14.	planting border plant	40	100
15.	Intercropping planting	40	100
16.	Changing time of planting	40	100
17.	Application of appropriate planting distance	40	100
18.	Prediction increasing of Pests and disease	40	100
19.	Gaining information of climate change	0	0
20.	Postharvest Handling with minimize weight loss	40	100
21.	Switch location	0	0
22.	Reducing land arable area	0	0
23.	Increasing land arable area	0	0
24.	Switching Profession from farmer to trader	0	0
25.	Switching commodity	0	0
26.	Part time job seeker	23	57.5
	Amount	**524**	**1310**

Source: Primary Data Processed (2021)

Based on table 1 can be explained that 26 adaption types, farmers just only applied many adaptation s to resolve the climage change condition. The applied of adaption by farmers were application of manure intensively, pest and diseases resistant varieties, wet and drought resistant varieties, chemistry pesticide, planting border plant, intercropping planting, changing time of planting, application of appropriate planting distance, Postharvest Handling with minimize weight loss. Adaptation has been conducted by all farmer respondents was 40 farmers or by 100%. Horticulture farmer also did adaptation Opposite contour tillage was about 52.5 %. Most of farmer did other adaptation like enhancement intensity of weeding, use seeds multiplication and part time job seeker. There are several factors that make farmer do adaptation climate change. Those factors are level education, level area of harvest failed, planting area,

credit availability, farming experience, and the existence of counselor[7] [8].

Not all adaptation was conducted by horticulture farmer in the Ngadisari Village, Sukapura sub districts, Probolinggo districts. Adaptations that were not conducted by farmer which was switch location, irrigation, cover crop plant or ground cover, biological control pesticide, reduction of chemical inputs, switching commodity, reducing and increasing land arable area and switching profession from farmer to trader. The reason farmer didn't switch their commodity is their land arable area just suitable for horticulture commodities.

3.3. The Obstacles Faced by Horticultural Sub-Sector Farmers in Ngadisari Village, Sukapura District, Probolinggo Regency

Climate change caused an impact on the agricultural sector where the sector concerns the livelihood of many people. The various impacts that farmers feel on their crops are the reason for making adaptation efforts. The farmers in Ngadisari Village mostly felt the impact of climate change on horticultural crops. The impacts felt by horticultural farmers include an increase in pests and diseases in plants. Some farmers also think that climate change would not have a big impact and continue to carry out agricultural activities as usual. Farmers felt that current climate conditions are difficult to predict.

The horticultural farmers in Ngadisari Village made an adaptation to climate change related with knowledge and capital. The obstacles experienced by farmers so that they did not adapt was because of the lack of information related to climate change. Some horticultural farmers were also constrained in capital to deal with climate change. Climate change that occurs caused diseases and pests come earlier so farmers need to spray more regularly. Spraying pesticides on a regular basis could be due a larger capital to be spent where the price of pesticides was getting more expensive. Even though the price of pesticides is increasing, farmers still bought pesticides to prevent plants from dying due to climate change.

3.4. The factors that influence farmer's decisions in adapting to climate change

There were many forms of adaptation to climate change that could be done by farmers to minimize the impact of climate change. Farmers' decision to implement climate change adaptation was influenced by several socio-economic factors of farmers. In order to show that there were factors that influence farmers' decision making to adapt, an analysis was carried out on farmers' decision making. The factors thought to influence farmers' decision making in adapting to climate change were a) age, b) experience, c) number of family members, d) land area, e) education level, and f) land ownership status.

The analysis used to test the factors that influence farmers' decisions in implementing adaptation to climate change is logistic regression analysis. Logistic regression analysis was an analysis conducted to determine the effect between the dependent variable and the independent variable. The dependent variable in the logistic regression model is a dummy variable. Logistic regression analysis was used by considering the dependent variable or variable (Y) has two categories, i.e. values 0 and 1. A value of 0 is used to categorize farmers who adapt in a low category, and a value of 1 to categorize farmers who adapt in a high category.

Before testing the factors that influence adaptation decisions with logistic regression analysis, there are several test criteria that must be fulfilled. It was intended that the regression model is feasible and can be used for further analysis. The results of logistic regression analysis to examine the effect of independent variables on farmers' decisions to adapt to climate change based on these criteria were

a) Regression Model Feasibility Test (Goodness of Fit)

Testing the feasibility of the regression model on the logistic regression model was conducted by looking at the Chi Square value and its significance value. The results of the feasibility test of the regression model can be seen in Table 2 below:

Table 2. Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	2.962	8	0.937

Source: Primary Data Processing (2021)

Based on Table 2, it could be seen that the results of the feasibility test of the regression model with Hosmer and Lemeshow showed the calculated chi-square value of 2.962, which is smaller than the chi-square table value of 15.51. While the significance value of 0.937 is greater than the error rate of 0.05. The results of the analysis indicate that at a 95 percent confidence level the logistic regression model used was suitable for further analysis because there was a significant match between the regression model and the observation data.

b) Overall Model Testing with G Test

The overall test of the model in the logistic regression model was shown in the Omnimbus Test of Model Coefficient table. The overall test results of the regression model in the study were in Table 3.

Table 3. Omnimbus Test of Model Coefficient

		Chi-square	Df	Sig.
Step 1	**Step**	29.59	0	0.000
	Block	29.759	0	0.000
	Model	29.759	0	0.000

Source: Primary Data Processing (2021)

Based on Table 3 above, it was known that the significance value obtained is 0.000 which was smaller than the error value of 0.05. The results of the analysis indicate that at the 95 percent confidence level, there was at least one independent variable that significantly affects the dependent variable and the regression model could be used for further analysis.

c) Test -2 log likelihood ratio and Nagelkerke R Square

The regression model was categorized as good if there was a decrease in the value of -2 log likelihood in step 1. While the Nagelkerke R Square value indicated that the percentage of the total independent variables affected the dependent variable. The results of the analysis of the -2 log likelihood ratio and Nagelkerke R Square test could be seen in Table 4 below.

Table 4. Model Summary

Step	-2 Log likelihood	Nagelkerke R Square
0	55.051	
1	25.292	0.702

Source: Primary Data Processing (2021)

Based on Table 4, it shown that the decrease in the value of -2 log likelihood in step 0 is 55,051 to 25,292 in step 1. The decrease in the value of -2 log likelihood indicated that the regression model could be categorized as good and could be used for further analysis. While the value of Nagelkerke R Square is 0.702. Based on the value of Nagelkerke R Square, information was obtained that the eight predictors (independent variables) were able to explain 70.2% of the total diversity of the regression model.

d) Classification Table

The classification table showed the percentage of farmers in making decisions to do or not to adapt to climate change. The results of the classification table test could be seen at the output classification table in Table 5.

Table 5. Classification Table

			Predicted		
			Adaptation Decision		**Percentage Correct**
			Low	**High**	
Step 1	Adaptation Decision	Low	19	3	86.4
		High	4	14	77.8
	Overall Percentage				82.5

Source: Primary Data Processing (2021)

Based on Table 5 showed that the number of farmers who were predicted to adapt in the low category was 19 farmers out of a total of 22 farmers who adapt to the low category, or farmers who adapt to the low category were 86.4 percent according to predictions using this model. Meanwhile, the number of farmers who are predicted to decide to adapt in the high category were 14 farmers out of a total of 18 horticultural farmers who made the adaptation in the high category, or farmers who make a high-category adaptation of 77.8 percent according to predictions using this model. The overall percentage value of 82.5 indicates that the logistic regression model used was quite good because it was able to predict the conditions that occur at 82.5%.

Wald's test was a test conducted to see the effect of each independent variable on the dependent variable. The decision-making criteria in the Wald test was when the significance value of the independent variable is smaller than the error level of 0.05, then the independent variable had a significant effect on the dependent variable and otherwise. The independent variables in the logistic regression model include; a) age (years), b) experience (years), c) number of family members (people), d) land area (ha), e) education (dummy 1, dummy 2, and dummy 3), and f) status land ownership (dummy 4). The results of the Wald test could be seen in Table 6 below.

Table 6. The Factors Influencing Horticultural Farmers' Decision Making to Adapt to Climate Change

Independent Variable	B	S.E	Wald	dF	Sig.	Exp (B)
Age (X1)	0.189	0.339	0.311	1	0.577	1.208
Experience (X2)	0.066	0.304	0.047	1	0.829	1.068
The number of family members (X3)	2.035	1.184	2.954	1	0.086	7.649
Land area (X4)	-0.382	0.175	4.775	1	0.029*	0.682

Independent Variable	B	S.E	Wald	dF	Sig.	Exp (B)
Education (D1)	21.387	20733.029	0.000	1	0.999	0.000
Education (D2)	3.901	2.496	2.443	1	0.118	0.371
Education (D3)	1.319	2.435	0.293	1	0.588	0.032
Land ownership status (D4)	-19.529	17545.513	0.000	1	0.999	0.000
Constant	7,150	17545.516	0.000	1	1.000	

Source: Primary Data Processing (2021)

Note: *) significant at 95% confidence level

The logistic regression obtained based on Table 6 followed the following equation.

$$P = ln\left(\frac{y(x)}{1-y(x)}\right) = 7{,}150 + 0{,}189\,X_1 + 0{,}066\,X_2 + 2{,}035\,X_3 - 0{,}382\,X_4 + 21{,}387\,D_1 + 3{,}901\,D_2 + 1{,}319\,D_3 - 19{,}529\,D_4. \quad (2)$$

The explanation of each of the free variables in the logistic regression model to test the factors that influence farmers' decisions in adapting to climate change is as follows:

1. Age (year)

The significance value of the age variable is 0.577. The value of this significance is greater than the specified error rate of 0.05, so it can be said that in the confidence level of 95 percent of the age variable has an insignificant influence on farmers' decisions in adapting to climate change. The coefficient of the age variable is positively 0.189. This suggests that the higher the age of the farmer or the older the age of the farmer does not significantly increase the chances of horticultural farmers to adapt to climate change with high categories.

The results of this study are in line with the results of research conducted by Apriliana and Mustadjab [9]. The results of the study stated that the age of farmers did not have a significant influence on farmers' decisions in carrying out agricultural activities. Farmers who are young and old have the same ability to adopt new innovations and technologies in agricultural activities. Therefore, the high ability of farmers to adapt to climate change is not influenced by the age of farmers.

2. Experience (year)

The significance value of the experience variable is 0.829. The value of this significance is greater than the specified error rate of 0.05, so it can be said that in the confidence level of 95 percent of the experience variable has an insignificant influence on farmers' decisions in adapting to climate change. The coefficient of the positive experience variable is 0.066. This suggests that the higher the farmer's experience in farming does not significantly increase the chances of horticultural farmers to adapt to climate change with high categories.

This research is in line with research conducted by Aprelesia et al., [10]. The results of the study stated that the experience of farmers does not affect decisions in doing farming. The experience of farming is not very influential because the ability of farmers in farming is not only obtained from experience. Farmers with low experience can also do farming by imitating the techniques of other farmers who have higher experience. Therefore, the experience of farming does not really affect the decisions of farmers.

3. Number of Family Member (Person)

The variable significance value of the number of family members is 0.086. The value of this significance is greater than the specified error rate of 0.05, so it can be said that in the 95 percent confidence level of variables the number of family members has an insignificant influence on farmers' decisions in adapting to climate change. The variable coefficient value of the number of family members is positively 2,035. This shows that the increasing number of family members borne by horticultural farmers in Ngadisari Village significantly increases the chances of horticultural farmers to adapt to climate change with high categories.

The results of this study are in line with research conducted by Setiawan and Januar which stated that the number of family members borne by farmers has no significant effect on farmers' decisions in farming [11]. This is due to the average number of family members owned by farmers in one house is able to meet their own needs. Farmers also do not rely too much on family members to do usahtani activities and do their own farming.

4. Land Area (Ha)

The variable significance value of land area is 0.029. The value of this significance is smaller than the specified error rate of 0.05, so it can be said that in the confidence level of 95 percent variable land area has a significant influence on farmers' decisions in adapting to climate change. The variable coefficient value of land area is negatively value of -0.382. This suggests that the higher the area of land owned by horticultural farmers significantly lowers farmers' chances of adapting to climate change with high categories. The estimated odds ratio or exp B variable land area is 0.682. The Exp (B) value shows that the wider the land owned by

horticultural farmers, it will reduce the chances of farmers adapting to climate change with a high category of 68.2%.

The area of land owned by respondent farmers is 0.5 ha to 7 ha. The land area is then divided into two groups, namely narrow and wide land area. Narrow land area is a land area between 0.5 ha to 3.5 ha. While the large land area is between 4 ha to 7 ha. Horticultural farmers who adapt to high categories are dominated by farmers with low land area. The number of farmers who adapt to high categories with narrow land area is as many as 11 farmers or 61% of the total farmers who make high category adaptations. While the number of farmers who adapt to high category with a large land area is only as many as 7 farmers or 39% of the total farmers who adapt high categories.

This research is in line with research conducted by Hayati and Maisaroh[12]. The results of the study stated that the area of land cultivated by farmers has a significant effect on farmers' decisions in farming. The more land area cultivated by farmers, the more difficult farmers are to do farming [13]. The wider the land cultivated also causes the higher the opportunity for farmers to get abundant crops, so that farmers are more active farmers take decisions in agricultural activities.

5. Education (Dummy)

The education level of horticultural farmers in Ngadisari Village consists of elementary, junior high, high school and bachelor. The level of education of farmers is used as a dummy variable, so the education variable is divided into three dummy variables (D) namely D1 (1 = Undergraduate education and 0 = non-Bachelor), D2 (1 = high school education and 0 = non-high school), and D3 (1 = junior high school education and 0 = non-junior high school). Based on the results of the logistic regression analysis, all educational variables, namely Dummy D1, Dummy D2, and D3 dummy have significance values of 0.999, 0.118 and 0.588 respectively. The value of this significance is greater than the specified error rate of 0.05, so it can be said that in the 95 percent confidence level all variables of education level have an insignificant influence on farmers' decisions in adapting to climate change. The coefficient values of all variables of the level of education are positive, namely 21,387, 3,901, and 1,319 respectively. his shows that the higher the level of education of farmers, the higher the chances of horticultural farmers to adapt to climate change is not significant. This research is in line with research conducted by Anisah and Hayati [12] which states that the level of education does not significantly influence farmers' decisions in farming.

6. Land Ownership Status (dummy)

The land ownership status variable in the logistic regression test is converted into a dummy variable (D4) categorized in two values, namely 1 and 0. Value 1 if the land ownership status is its own and value 0 if the land ownership status is rent. The variable significance value of land ownership status is 0.999. The value of this significance is greater than the specified error rate of 0.05, so it can be said that in the confidence level of 95 percent variable land ownership status has an insignificant influence on farmers' decisions in adapting to climate change. The coefficient value of the variable coefficient of land ownership status is negative, which is -19,529. This shows that if the status of land ownership owned by farmers is their own, it will significantly reduce the chances of horticultural farmers to adapt to climate change with the highest category.

This research is in line with research conducted by Hayati and Maisaroh[14]. The results of the study showed that the status of land ownership cultivated by farmers did not significantly affect farmers' decisions in carrying out agricultural activities. This is because farmers do not consider the status of land ownership to decide to do their farming. Even though the land is rented land, farmers are still free to determine activities in their farming so as not to affect farmers' decisions.

4. CONCLUSIONS

The phenomenon of climate change felt by horticultural farmers in Probolinggo Regency in 2021 is an earlier rainy season, and the intensity of rainfall and the number of rainy days' increases. The form of adaptation carried out by coffee farmers and horticultural farmers is in the form of saving input use, using intensive manure, using pest and disease resistant varieties, using rain and drought resistant varieties, processing land against contours, using chemical pesticides, increasing weeding intensity, using propagation of seeds, changing pruning and fertilizing schedules, intercropping/ turnover planting, changing planting times, applying recommended spacing, handling crop yields, and looking for part-time jobs [15,16]. The obstacles faced by horticultural farmers in Probolinggo Regency in adapting to climate change are the lack of knowledge and information related to climate change and limited capital. A significant factor influencing the decisions of horticultural farmers in Probolinggo Regency in adapting is land area. The wider the area of land owned by horticultural farmers, the lower the chances of farmers adapting to climate change with a high category of 68.2%.

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