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THE POTENTIAL OF DUSUNG IN NALAHIA STATE, NUSALAUT DISTRICT, CENTRAL MALUKU DISTRICT

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Abstract

Nalahia village is one of the villages in Nusalaut District where 95% of the people live in the dusung pattern. The aim of the research is to analyze the potential of dusung and community perceptions regarding potential and participation. The methods used were observation, interviews and filling out questionnaires. The analysis carried out was descriptive qualitative and quantitative. The conclusion of this research is that the community strongly agrees that the potential of the dusung Nalahia supports the ecology and economics of the environment and family income. The Dusung Nalahia type is dominated by clove and nutmeg plants. The planting pattern used by the community is an irregular planting pattern, and follows the planting pattern that has been used for a long time. The results of the regression test show that agroforestry potential (X2) has an influence on community participation in dusung management, while community perception (X1) does not significantly influence variable Y (participation). Simultaneously (F test) it can be seen that the two variables (X1 and X2) have a significant influence on the participation variable with a percentage of 30.5%

Keywords: *Dusung, Nalahia State, Central Maluku*

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INTRODUCTION

Agroforestry pattern is a land use pattern by combining agricultural crops (agriculture) and forest trees or forestry (forestry) in the same space and time dimensions. This pattern has long been practiced by the people of Maluku, known as "dusung" (Silaya, 2012). Dusung is a form of land management of the Maluku people that has been inherited from the ancestors to the present generation. Dusung management in Maluku can be said to be similar to agroforestry (Salampessy., et al. 2012; Matinahoru, 2014; Heluth, et al. 2018; Wattimena, et al. 2019; Sahureka, et al. 2021; Sitaniapessy, 2021). However, there are types of hamlets in Maluku that only have one type

of plant on the hamlet land, for example, clove hamlets, or sago hamlets where the entire hamlet area is only planted with one type of plant. However, currently 90 percent of hamlets in Maluku have the same planting pattern as the agroforestry planting pattern, where the types of plants in the land consist of several types of plants. The hamlet pattern of Maluku people is usually dominated by annual plants, fruit-producing plants, medicinal plants, and vegetables. Almost all villages or villages in the Maluku region still maintain hamlet management as a basis for utilizing their land to supply family food needs.

Nalahia Village is one of the villages in Nusalaut District where 95% of the population still lives in a hamlet pattern (Nusalaut in Figures 2022). Hamlets in Nalahia Village are heirloom hamlets or inheritances from parents that are passed down to the family and distributed based on the number of family members they have. The hamlet management system in Nalahia Village consists of personal, household (Soa) and group management of the hamlet (Kroons et al., 2022). The Nalahia community itself manages its hamlet with a planting pattern that has been created by its elders in a distribution pattern, or a line and parallel pattern. This pattern is then continued by family members by maintaining the ecological conditions of the plants in the hamlet in a sustainable manner. This hamlet pattern is a form of traditional wisdom of the Maluku people whose management process is carried out together by the entire family.

ICRAF (2003), defines Agroforestry as a plant management system in an area, which contains agricultural crops and forestry or livestock crops. Dusung is defined as a garden or yard area or a former secondary forest area that is hundreds of years old, the land is inherited from ancestors and managed from generation to generation to meet family needs. Dusung can support the community's food needs, the need for housing in supplying raw materials for community houses and household furniture, boats, and various basic wood needs. In addition, dusung also provides additional income through the potential of fruit-producing plants such as nutmeg, walnuts, durian, langsat and cempedak. (Parera et al., 2021); (Passal et al., 2019; Lensari et al., 2022.

Agroforestry is believed to be an alternative to land management that is carried out optimally by combining several types of forestry plants interspersed with planting agricultural crops, so that the benefits obtained can be felt sustainably by the community. In addition, the mixture of these types of plants can support aspects of land conservation and cultivation (Ikhsan & Wijayanto, 2019); (Irwanto et al., 2022). Forms of agroforestry generally include mixed gardens, tree-covered fields, fallow lands (shrubs), yard gardens and wider community plantation forests that are richer in species (Hadi, 2013); (Purba et al., 2020)

In some areas, especially in rural areas, the development of yards is generally directed to meet daily food sources, so it is called a living barn or living shop (Rahayu and Prawiroatmodjo, 2005). The expected management objectives in this research in Nalahia are that the potential of existing resources can be utilized optimally and sustainably, in the sense that community welfare can increase without causing damage and degradation of natural resources and the environment that can harm the survival of future generations.

The agroforestry system emphasizes its use of multi-purpose tree species and determines the association between the types of vegetation planted. In the context of agroforestry, multi-purpose trees mean all trees or shrubs that are used and managed for more than one use of products or services with an emphasis on economic and ecological aspects (Senoaji, 2012; Wijawanto et al., 2015; Olive et al., 2015; Amin et al., 2016; puspasari et al., 2017; Suryana et al., 2022). Efforts to implement sustainable land are considered to be one of the solutions to improve soil elements and maintain the biodiversity in the village (Thangataa et al, 2012).

The diversity of potential types of plants cultivated by farmers in the hamlet area has direct benefits in increasing the types of plants available and becomes a supporting potential for the village/country in preparing the needs of the Nalahia Village community in a sustainable manner. This study aims to analyze the potential for agroforestry in the Nalahia hamlet, Nusalaut District, Central Maluku Regency, and how the community perceives the economic and ecological benefits that can be felt by the Nalahia hamlet community.

RESEARCH METHOD

The research was conducted in Nalahia Village/Country, Nusalaut District, Central Maluku Regency. The data collection period lasted for 10 days starting from November 22 to December 2, 2023. Sampling in this study used the purposive sampling method or sampling based on the number of Dusung ownership of 20 plots located in Nalahia Village/Country. This sampling was carried out by recording the number of families who own land and actively manage their land every day.

After knowing how many farmers own Dusung, the author can take samples from the existing population. The sample taken was 30% of the population. The population used was based on the number of heads of families in Nalahia Village, which was 103 families. All heads of families have dusung and still carry out their activities every day. So the number of respondents needed was 30 respondents. Interviews were conducted to find out the types of agricultural and forestry crops planted, as well as the benefits directly obtained by the community. Primary data in this study are the results of observations and structured interviews with the owners of the agroforestry land as managers, and questionnaires were also filled out. While secondary data is a source of research data that is not directly taken from the field, but is the result of research or data from previous studies related to the objectives of the current study (Sugiyono, 2017). Measurements on all plots were carried out on all plants related to the agroforestry component. For trees, the types that have a diameter at breast height (1.3 m above the ground) were identified and measured, while all existing types of agricultural crops were identified. Trees with a diameter of less than 5 cm and palms with trunks less than 20 cm were not included.

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Figure 1. Nalahia State Data Collection Location

Data analysis was conducted using descriptive analysis, where descriptive analysis is a description of an event and facts that are seen and observed directly during the research, which is conducted based on related information about the potential of agroforestry in Nalahia. In addition, a scoring analysis was also conducted using a Likert scale. Scoring analysis using a Likert scale is used to assess community perceptions of the potential of agroforestry.

$$\text{Indeks}(\%) = \frac{total\ skor}{skor\ maxsimum} \times 100\%$$

In this study, the relationship between the two independent variables (X1 = potential and X2 = perception) on the participation of the community of hamlet owners in Nalahia was also analyzed, using multiple linear regression analysis. The regression equation in this study is:

$$Y1 = a + \beta\ 1.X1 + \beta\ 2.X2 + e1$$

Where:

Y = Participation of Dusung Nalahia farmers
b0 = Constant
b1, b2, = Regression Coefficients
X1 = Public perception
X2 = Dusung potential
e = error (error): 1% (0.01)

To test the significance of the influence of variables on the independent variable, a partial correlation analysis is then carried out to determine the form and strength of the relationship between the independent variable and the dependent variable.

Results and Discussion

The Characteristics of Dusung Nalahia Farmers

A person's age can influence their performance and daily activities, both physically and non-physically. According to Chaniago (2002) and BPS (2023), age is categorized into three groups: young or non-productive age (0-14 years), adult or productive age (15-64 years), and elderly or non-productive age (65 years and above). The composition of farmers based on age is presented in Table 1 below.

Table 1. Characteristics of Dusung Farmers in Nalahia Village

Farmer Characteristics	**Total**	**Percentage (%)**
Age		
17-25 year	-	-
26-35 year	-	-
36 - 45 year	7	35
46 - 55 year	11	55
56 - 65 year	2	10
Gender		
1 Male	18	90
2 Famale	2	10
Qualification		
Elementary school	3	15
Junior high school	3	15
High School	14	70
Diploma	-	-
Bachelor	-	-
Employment		
Civil Servant	-	-
Farmer	16	80
Fisherman	-	-
Housewife	2	10
etc	2	10
Land area		
0-0,5 Ha	13	65
0,6-1 ha	3	15
2-3 Ha	4	20
3-5 Ha	-	-
6- 10 Ha	-	-
Land ownership		
Private property	20	100
Family property	-	
Village Property	-	
Amount of land managed		
1 plot	9	45
2 plot	9	45
3 plot	1	5
4 plot	1	5
Annual income		
1-2 million	-	-
3-4 million	-	-
5-6 million	5	25
>7 million	15	75

Based on the analysis of Table 1, it can be explained that the average age of farmers falls within the productive age category, with a percentage of 70%, accounting for 21 out of 30 respondents. Meanwhile, the non-productive age category comprises 30% of respondents, totaling 9 out of 30. Respondents aged 15 to 64 years are classified as being in the productive age group because their ability to manage dusung land remains relatively high compared to farmers who have surpassed the productive age of 65 years and above, where their intensity in managing dusung land has declined.

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The age factor significantly influences farmers' work capacity and the duration of their engagement in dusung activities. Due to the considerable distance between their homes and dusung land, farmers aged 55 years and above are often no longer active in working on their dusung land. Instead, they shift their activities to land located closer to their homes, such as home gardens. Additionally, age also affects farmers' perceptions and attitudes in supporting their productivity in managing dusung land (Suandi et al., 2014).

The average education level of Nalahia farmers is at the junior high school level (15%) and senior high school level (70%). Education plays a crucial role, as understanding the level of education helps assess farmers' ability to implement strategies and efforts to improve the management of their dusung land. Additionally, knowing farmers' education levels allows for an assessment of community welfare through the development of dusung-based businesses to support household needs and economic stability.

Sedarmayanti (2019) states that through knowledge and education, farmers are equipped with the necessary skills to recognize, understand, and develop methods to solve future challenges in their lives. Adequate education enables farmers to better understand and adopt technology and innovations that can enhance the optimization of dusung land management (Simanjuntak et al., 2023).

In Nalahia, 80% of the population has farming as their primary occupation. This indicates that dusung land management is carried out more intensively, as farmers have optimal time to focus on its cultivation. Additionally, both the ecological and economic conditions experienced by farmers can be directly addressed since their attention is fully dedicated to their dusung land.

However, as smallholder farmers, their income is still insufficient to fully meet their family's needs. A similar view is supported by Siwalette (2018), who states that the income generated from dusung farming is not yet sufficient to guarantee farmers' long-term needs. This is also influenced by the number of family members and the variety of commodities grown in the dusung. If high-value commodities such as cloves and nutmeg are cultivated on large dusung land, farmers can achieve significant profits. However, if the dusung land is small and the crops are mainly grown for household consumption, it may not be sufficient to ensure a stable livelihood for dusung farmers.

The dusung land managed by farmers in Nalahia is predominantly small in size, with approximately 65% of farmers cultivating plots of only 0.5 hectares. The primary crops grown include durian, nutmeg, canarium nuts, and cloves. In addition, some farmers also plant jackfruit, breadfruit, papaya, and bananas, mainly for household consumption. The dusung areas in Nalahia are classified into three categories based on land size: small (<0.5 hectares), medium (0.5–2.0 hectares), and large (>2.0 hectares) (Wattimena & Makaruku, 2022).

The management of dusung by the Nalahia community is still primarily focused on fulfilling household needs. Research findings indicate that land cultivators continue to practice subsistence farming, with no commercial orientation. Limited production factors, such as land availability, capital, labor, and farmers' knowledge, have resulted in a subsistence-based planting pattern that has been maintained over time.

Table.2 Average Agroforestry Production in Nalahia State

Commodity Type	Amount of productivity per year (kg/fruit/bunch)	Average Productivity per year per plot (kg,/fruit)	Total annual sales value per plot
Syzygium aromaticum	1874 kg	62,13	172.150.000
Myristica fragrans	243 kg	20,25	35.050.000
canarium spp	240 kg	20	2.000.000
Durio zibethinus	1800 fruit	200-400	4.000.000

Hamlet Management in Negeri Nalahia is an agrosilviculture management pattern. The type of agroforestry is a forestry planting pattern with non-forestry types. The agrosilviculture pattern supports the socio-economic conditions of the community. Based on the results of the analysis in Table 1, it can be seen that 40% of respondents planted their hamlet land with 2 types of plants, namely forestry plants and agricultural plants, and 60% planted 3 types of plants, namely forestry plants, agriculture, and fruit-producing plants. The reasons for choosing the types of plants used by the community are influenced by the suitability of the biophysical conditions of the hamlet, ease of management and maintenance because they have been done for a long time with the family, becoming a legacy from parents and just being continued by the next generation, thus supporting the diversity of results. A similar opinion was also expressed in the research of Salampessy *et al*., (2017) and Kroons *et al*., (2022), that the reasons for choosing the types of plants used by the community in the hamlet pattern are to create diversity of types and reduce crop failure of hamlet farmers.

Based on the results from dusung (traditional agroforestry system) in each household, several plant species are considered by the community of Nalahia to have high economic value. Among them, clove (Syzygium aromaticum) accounts for 30% and nutmeg (Myristica fragrans) for 35%. Meanwhile, other plant species are cultivated primarily for timber production and hold economic value from that perspective. Additionally, durian (Durio zibethinus) and canarium nuts (Canarium sp.) each contribute 15% to the local economy. These two species provide both timber and fruit, which are sold by the community, and in some cases, processed into post-harvest products by village women. Durian is processed into durian dodol (a traditional sweet), while canarium nuts are turned into halua kenari (a candied nut product). These post-harvest products serve as an additional source of household income.

The net income earned by the community varies; based on interviews, approximately 75% of households earn between IDR 7 to 10 million per year, while the remaining 25% earn less than IDR 7 million annually. The variation in income is influenced by the land size and the types of crops cultivated in the agroforestry system. Households that do not plant high-value crops tend to earn lower incomes. Similar findings were reported by Putra et al. (2020), who stated that income from agroforestry systems generally varies depending on the size of the land managed by each household and the suitability of the land for specific commodities.

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Although the income generated from dusung cultivation helps fulfill the farmers' household needs, interviews with several respondents indicated that it is often insufficient to fully support all family members, especially in larger households. Maalalu et al. (2020) noted that dusung management serves as an indicator of household economic sustainability, as income from dusung production contributes significantly to fulfilling family needs. Meanwhile, Putra et al. (2020) explained that income is a key economic indicator for farmers, as it determines their ability to meet daily needs. However, the economic value of agroforestry commodities plays a crucial role in determining farmers' total earnings. The findings of this study suggest that dusung cultivation in Nalahia is still categorized as subsistence farming rather than commercial-oriented. Limited production factors, such as land, capital, labor, and innovation, influence the farming patterns and crop selection in dusung management (Simanjuntak et al., 2023).

Land tenure in Nalahia's dusung system is relatively strong, although some areas are managed communally due to kinship ties, with dusung ownership often based on ancestral family divisions (mata rumah system). The management of dusung is typically carried out individually. The dominant agroforestry model involves mixed cropping, with clove and nutmeg as the primary cash crops, interplanted with other species such as durian, canarium nuts, jackfruit (*Artocarpus integer*), and banana (*Musa spp.*). The boundaries between dusung plots are still marked using natural indicators, such as trees and wooden poles, which are mutually recognized by neighboring landowners.

Table 3. Potential of Nalahia Community Hamlet in Central Maluku Regency

Components	Score total	Index (%)
Understand agroforestry (hamlet)	74	18
Understand the concept and pattern of selecting species planted in the dusung	80	20
Have an economic impact	80	20
Have an ecological impact	51	13
Providing sustainability of crop yields	70	17
Implementing Conservation Measures in Hamlet Management	80	20

Community Perception of Dusung Management in Nalahia Village

The assessment results of the community's perception of agroforestry potential in Nalahia can be seen in Table 2. The perception of agroforestry potential and management was evaluated using six measured indicator elements. Based on the analysis results in Table 1, it was found that 100% of the Nalahia community is aware of the dusung concept, which has been managed in their village for generations. Additionally, the planting patterns follow traditional practices established by their ancestors, which are irregular in arrangement. Farmers integrate three types of commodities within their dusung land: forestry crops, fruit-producing plants, and vegetables, which characterize the dusung system of the Nalahia community.

The community also strongly agrees that the dusung system supports the ecological condition of the land and sustains household food needs. The scoring results indicate that the community's perception of the potential and management of dusung can be considered positive. These scoring results also reflect individuals' perceptions or views of a condition or phenomenon that has been directly observed in the research location.

Perception plays a crucial role in assessing the level of community understanding regarding dusung resources, which they have long recognized and managed. This, in turn, serves as a reference for developing more optimal and sustainable management strategies. Purnomo et al. (2017) stated that perception plays a significant role in influencing individual behavior patterns related to the functions and benefits of agroforestry potential.

Relationship Between Perception and Potential Towards Farmer Participation in Nalahia Hamlet

To see the relationship between the variable of farmer participation in the hamlet and the variables that influence it, namely perception and agroforestry potential, a multiple linear regression equation was used. However, before the data was obtained, several tests were carried out, namely the classical assumption test consisting of normality, multicollinearity, autocorrelation and heteroscedasticity tests. In addition, the coefficient of determination (R2) test and the t and f tests were also carried out to test how much the independent variables can explain and influence the dependent variable.

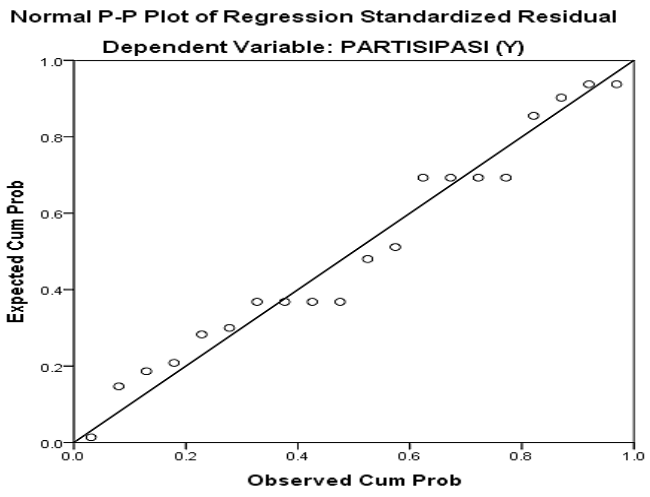
The Relationship Between Perception and Potential on the Participation of Dusung Farmers in Nalahia

To examine the relationship between farmers' participation in dusung and the influencing variables, namely perception and agroforestry potential, a multiple linear regression equation was used. However, before analyzing the data, several tests were conducted, including classical assumption tests such as normality, multicollinearity, autocorrelation, and heteroscedasticity tests. Additionally, the coefficient of determination (R^2) test, as well as t-tests and F-tests, were performed to assess the extent to which the independent variables explain and influence the dependent variable.

a. Normality Test

The results of the normality test can be seen in Figure 2 below

Figure 2. Normal P-P Plot Normality test *(Normal P-P Plot on normality test)*



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Based on Figure 2 above, it can be seen that the distribution of data points is relatively close to a straight line, indicating that the residuals (data) follow a normal distribution. Therefore, the results meet the classical assumptions, and the linear regression using the OLS (Ordinary Least Squares) approach is valid.

Multikolinearitas

The results of the multicollinearity test can be seen in Appendix 1. The VIF values for the perception variable (X1) and the potential variable (X2) are 1.011 and 1.011, respectively, while their tolerance values are 0.989 and 0.98. Since the VIF values of the variables are not greater than 10, it can be concluded that there is no multicollinearity between the independent variables. Therefore, the model is free from multicollinearity. The results of the multicollinearity test can be seen in Figure 3 below.

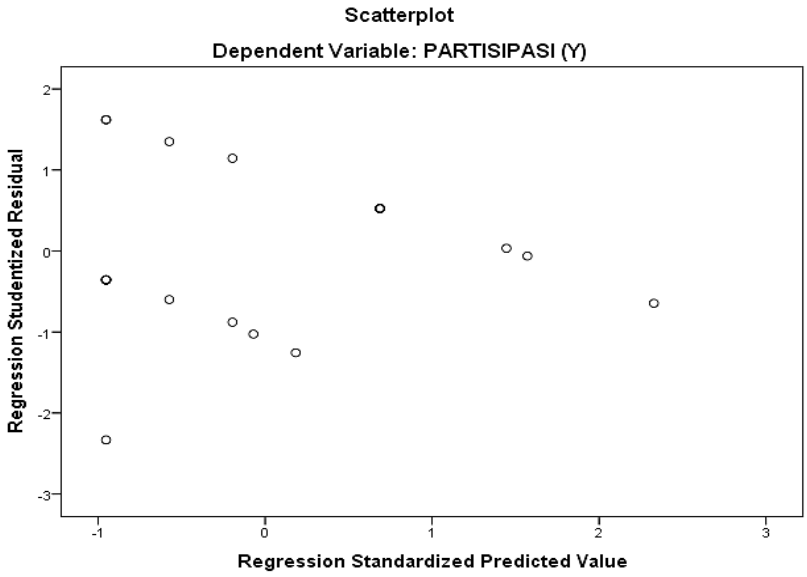
Figure. 3. SPSS Test Results multicollinearity

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	28.978	4.492		6.451	.000		
	Hamlet potential (X2)	-.423	.179	-.480	-2.361	.030	.989	1.011
	Community Perception (X1)	.127	.113	.228	1.122	.278	.989	1.011
a. Dependent Variable: Participation (Y)								

Heteroskedastisitas

The results of the heteroscedasticity test using the Scatterplot of ZPRED and ZRESID can be seen in the scatterplot image below figure 4.

Figure 4. SPSS Test Results Heteroscedasticity



From the image above, it can be seen that the distribution of points does not form a specific pattern or trend. Therefore, it can be concluded that heteroscedasticity does not occur, meaning that the classical assumption of heteroscedasticity in this model is satisfied.

Autokorelasi

The results of the autocorrelation test using Durbin-Watson can be seen in Figure 5, in the last column of the Model Summary.

Figure 5. SPSS Model Summary Analysis Durbin Watson

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.553[a]	.305	.224	.535	1.023
a. Predictors: (Constant), Community Perception (X1), Hamlet potential (X2)					
b. Dependent Variable: Participation (Y)					

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The analysis results in Figure 5 show that the Durbin-Watson value is 1.023. According to Imam Ghozali (2011), if the dU value is 1.537, meaning the DW value falls between dU and 4-dU, the analysis results indicate that there is no autocorrelation in the model.

T-TEST

The t-test is an analysis that determines whether variable X1 or X2 has an effect on variable Y. According to SPSS guidelines, a variable X will significantly affect Y if the Sig value is less than 0.05. Based on the SPSS analysis results shown in Figure 5, the significance value of variable X1 is 0.278, indicating no effect on Y. In contrast, the significance value of X2 (Agroforestry Potential) is 0.030, which indicates an effect on Y since it is less than 0.05.

Figure 7. SPSS Test Results Coefisients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28.978	4.492		6.451	.000
	Hamlet Potential (X2)	-.423	.179	-.480	-2.361	.030
	Community Perception (X1),	.127	.113	.228	1.122	.278
a. Dependent Variable: Participation (Y)						

F- TEST

The results of the F-test analysis in the ANOVA table indicate that variables X1 and X2 simultaneously influence variable Y. According to Imam Ghozali (2011), if the significance value (Sig) is less than 0.05, it means the variables have an effect on Y. As shown in Figure 7, it can be concluded that variables X1 and X2 simultaneously influence variable Y, as the significance value is 0.045 (< 0.05).

Figure 7. SPSS Anova Test Results

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	2.138	2	1.069	3.737	.045[b]
	Residual	4.862	17	.286		
	Total	7.000	19			
a. Dependent Variable: Participation (Y)						
b. Predictors: (Constant), Community Perception (X1), Hamlet Potential (X2)						

The Relationship Between Agroforestry Potential and Community Participation in Dusung Management in Nalahia

Based on the results of the regression analysis calculations, the regression equation is formulated as follows:

$$Y = 4492 + 113X1 + 179X2$$

The magnitude of the coefficient values for the perception level variable (X1) and the dusung potential variable (X2) can be determined by looking at the regression coefficient values (b1 and b2). The equation shows a constant value of 44,920, which mathematically indicates that when the perception level and potential remain constant, community participation reaches 44,920 per month.

The significance value or standard error of each variable must be less than 0.05 (or <5%) for the variable to be considered significant, meaning it has a real effect on dusung farmers' participation. The multiple linear regression analysis determines that the dusung potential is the most significant factor influencing community participation, implying that the higher the dusung potential, the greater the participation in dusung management. Meanwhile, the F-test results indicate that both variables simultaneously have a significant influence on participation in management.

The study findings suggest that the forms and levels of participation in dusung management in Nalahia still need improvement. Similar views are expressed by Ruhimat (2016) and Yeni et al. (2020), who state that the level and form of farmers' participation should be enhanced to a level where their aspirations and expectations are genuinely considered and adopted in decision-making and partnership policies. Support in the form of policies, the availability of agroforestry technology packages, and the optimization of involvement from all Regional Technical Implementation Units (UPTD) and research institutions/universities are fundamental determinants for the success of future dusung management and development.

Conclusion

The community strongly agrees that dusung management in Nalahia supports both ecological and economic aspects, benefiting the environment and household income. The dusung in Nalahia is predominantly composed of clove, nutmeg, canarium, and durian trees. The planting pattern practiced by the community is irregular and follows traditional methods that have been passed down through generations.

The regression analysis results indicate that agroforestry potential (X2) significantly influences community participation in dusung management, while community perception (X1) does not have a significant impact on the participation variable (Y). However, the

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F-test results show that both variables (X1 and X2) collectively have a significant influence on participation, with a contribution of 30.5%

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