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Models to Increase the Farmers' Participation on the Implementation of Lowland Rice Balanced Fertilization in Cikoneng Subdistrict Ciamis

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ABSTRACT: *Lowland rice production is the main commodity from the agricultural sector of CikonengSubdistrict with an area of 740.26 ha. One of the efforts of the Ministry of Agriculture to overcome the problem of excessive use of chemical fertilizers, which lead to a negative impact on the environment, is to recommend the implementation of balanced fertilization. Thus, the research conducted with the title "Model of increasing farmers' participation in the implementation of balanced fertilization of lowland rice in Cikoneng Sub-district, Ciamis District. This study aimed to: describe the level of farmers' participation, analyze the factors that influence the level of farmers' participation and to formulate strategies to increase farmers' participation. The study was conducted for three months (April - July 2019) in Cikoneng Sub-district. The sampling technique was done by purposive sampling in four stages with a total of 80 people samples. The type of data consisted of secondary data and primary data with direct interviews using a questionnaire that has been proven with validity and reliability tests. Data were analyzed descriptively and multiple linear regression. The results showed that the participation of farmers in CikonengSubdistrict was categorized in the medium category, the factors that influenced farmers' participation were external factors reached 0.138 points and the characteristics of farmers (0.024).*

Keywords: *Participation, Balanced Fertilization, Lowland Rice*

I. INTRODUCTION

Lowland rice production is the main commodity of the agricultural sector of Ciamis District which amounted to a harvest area of 140,178 ha of farm area in 2017 with a productivity of 6.5 tons/ha (BPS Ciamis, 2017). CikonengSubdistrict has 740.26 ha of farming area, with a productivity of 6 tons / Ha (BPS Cikoneng District, 2017). The level of implementation of balanced fertilization technology for rice in the CikonengSubdistrict is still low at around 43 percent. Various programs have been made by the Agricultural Counseling Center (BPP) of CikonengSubdistrict to increase the lowland rice production, among others; Integrated Crop Management Field School Program (SL-PTT), UPSUS Program for Rice-Corn-Soybean (PAJALE), The Planted Land Expansion (LTT).

The effort taken by rice farmers in the context of increasing production is the use of chemical fertilizers, which from time to time dominate the cultivation patterns and cause unfavorable impacts on the texture and biology of soil including soil microorganisms and impacts on suboptimal production. One of the efforts taken by the government, especially the Ministry of Agriculture, to overcome the problem of excessive use of chemical

fertilizers is by combining organic fertilizer with inorganic fertilizer (chemical) to improve land conditions and aiming at restoring soil fertility. Thus, efforts need to be more convincing for farmers on the benefits of using balanced fertilization technology in rice cultivation, with a series of studies entitled "Models to increasethe farmers' participation on the implementation oflowland rice balanced fertilization in CikonengSubdistrict, Ciamis District ".

Based on preliminary surveys and interviews with extension agents, the problem of rice cultivation is the low level of implementation of balanced fertilization. Thus, the research problem was formulated as follows: (1) how is the level of farmers' participation in the implementation of balanced fertilization of lowland rice in Cikoneng Sub-District, Ciamis District? (3) what is the model to increase farmers' participation in the implementation of balanced fertilization of lowland rice in Cikoneng Subdistrict?. Meanwhile, the research objectives were: (1) to describe the participation of farmers in the implementation of balanced fertilization of lowland rice in the CikonengSubdistrict, Ciamis, (2) to analyze the factors that influence the level of farmers' participation in the implementation of balanced fertilization, and (3) to formulate a strategy in increasing farmers' participation in the implementation of balanced fertilization of lowland rice in Cikoneng Sub-district, Ciamis District.

Framework

Farmers' participation of individuals in certain areas could have different levels. This difference can occur because of the factors related to the participation, these factors need to be known as a reference in making planning for the extension activities to increase the farmers' participation in the implementation of balanced fertilization. These factors include the characteristics of farmers and the role of extension agents who are directly related to farmers as the main actors. The characteristics of farmers are age, education level, and farm area, while the roles of extension agents are facilitators, motivators, mediators, and external factors including the availability of facilities and infrastructure, availability of agricultural information, and the intensity of agricultural extension. The hypothetical framework is as follows:

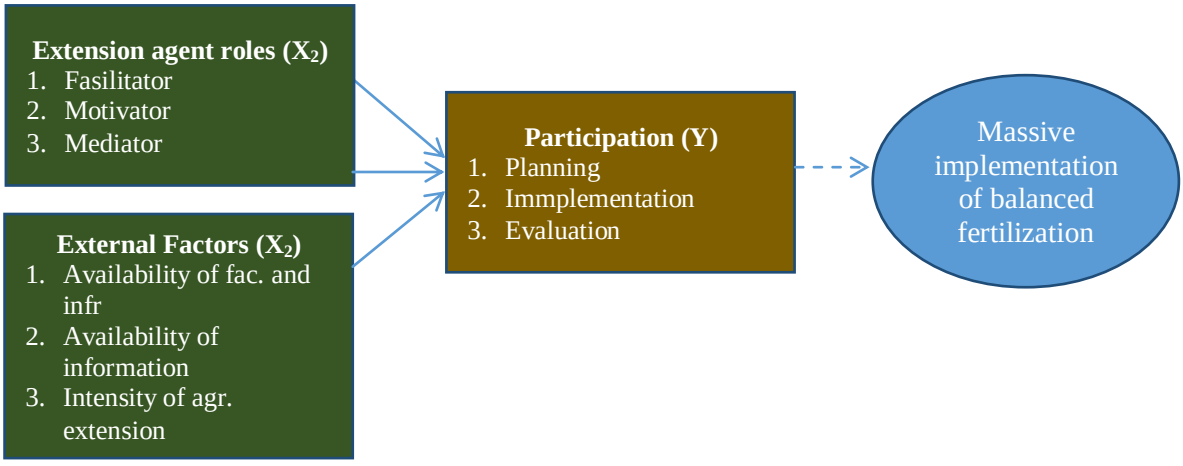


Figure 1. Hypothetical Framework for Research Variables

II. RESEARCH METHOD

The study was conducted for three months (April - July 2019) in Cikoneng Subdistrict. The sampling technique was done through purposive sampling by four stages with a total sample of 80 people. The study population was a member of a farmer group in Cikoneng Subdistrict who had received the SL-PTT Program for lowland rice. Three villages that have received the program were Panaragan, Kujang, and Sindang Sari Village, with a total population of 396 people from six members of farmer groups. The number of 80 samples were proportionally divided into each group of farmers; Tirta Utama III Farmers group (17 people), Tirta Utama II (15 people), Gunung Jaya (19 people), Awi Kiara II (9 people), Bumi Lestari II (10 people), and Singkup Mekar (10 people). The instrument used was a closed questionnaire consisting of 45 questions, which has been proven with validity and reliability tests.

Primary data were collected from questionnaires, farmer interviews, and field identification, while secondary data was collected from other supporting data from farmer groups and related institutions such as BPP Cikoneng District, Department of Agriculture and local government. Before being analyzed, the data collected is tabulated and grouped according to their respective variables. To describe the level of farmers' participation of farmers in the implementation of balanced fertilization of lowland rice, the data were analyzed with descriptive statistics, while to determine the factors affecting data participation were analyzed by multiple linear regression with the equation $Y = a + b_1.X_1 + b_2.X_2 + b_3.X_3$. Data analysis used SPSS program series 2.0

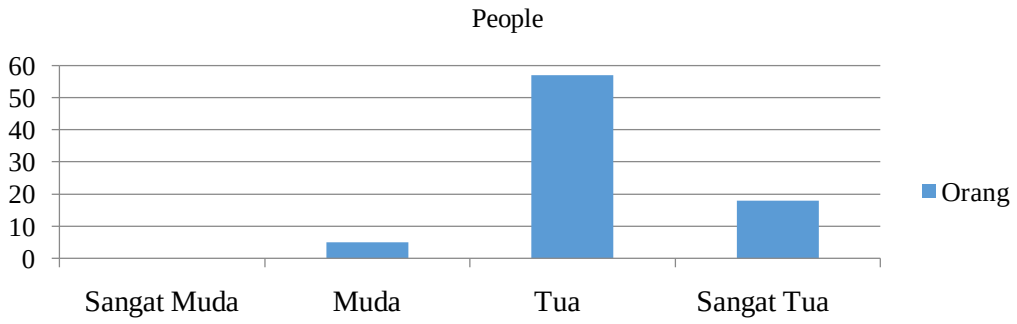
III. RESULT AND DISCUSSION

Characteristics of Farmer

Age

The results showed that respondents were in four age categories, namely: Very Young (<20 years), Young (21-40 years), Old (41-60 years), Very Old (> 60 years). Details of each category are presented in the following figure:

Table 1. The agecategory of respondents



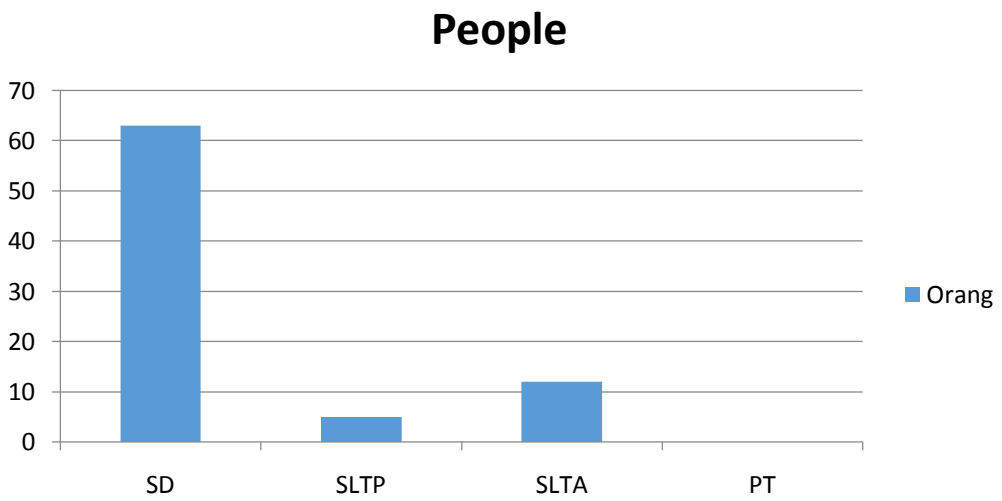
Source: The data is processed by the authors in 2019

Based on Table 1, the majority of respondents in CikonengSubdistrict, especially in the Panaragan, Kujang and Sindang sari villages are categorized as old age with 57 people ranging from 41-60 years old from 80 respondents. According to Resilla (2012), people who enter the old group tend to always stick with old values and they are estimated as people who difficult to accept new things. Moreover, the spirit of work for elder people tends to decrease. Therefore, they are no longer able to manage their farms properly and difficult to develop their own potential. However, farmers are still productive in carrying out farming activities because of the necessity to meet their daily needs.

Educational level

The educational level of respondents is classified into four categories, namely low (elementary), medium (junior high), high (high school) and very high (College). Details of the educational level of respondents are presented in the following figure:

Table 2.The education level of respondents



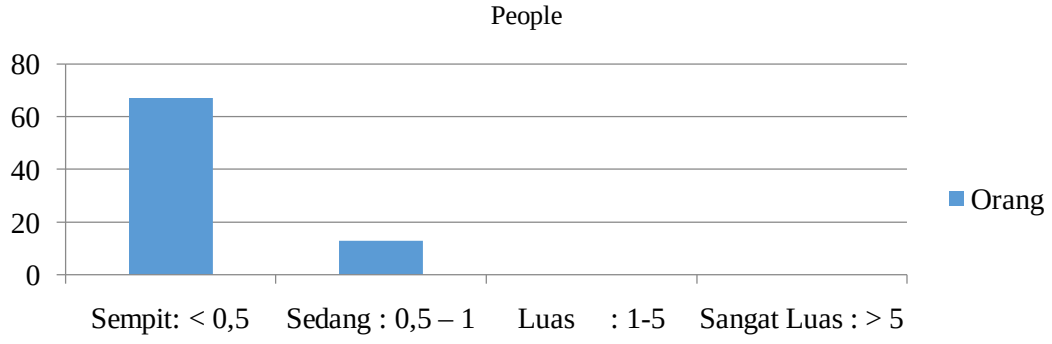
Source: The data is processed by the authors in 2019

Based on Table 2, the education level of most respondents is in the low category, dominated by elementary school graduates around 63 people. The lower education level will affect the low level of farmers' insight and understanding of agricultural information during the extension process. This is in line with Ismilaili (2015), who stated that education is a series of teaching and learning processes that produce behavioral change. Education is the first factor in determining the level of a person's innovation. The duration of attending formal education, supplemented by non-formal education and especially school with special skills will complete the experience and thinking ability of farmers.

Farming area

Totalfarming area of respondents is classified into four categories; narrow (<0.5 ha), medium (0.5-1 ha), wide (> 1 ha) and very wide (> 5 ha). The details of farming area ownership level of respondents are presented in the following figure:

Table 3. Thefarming area ownership level of respondents



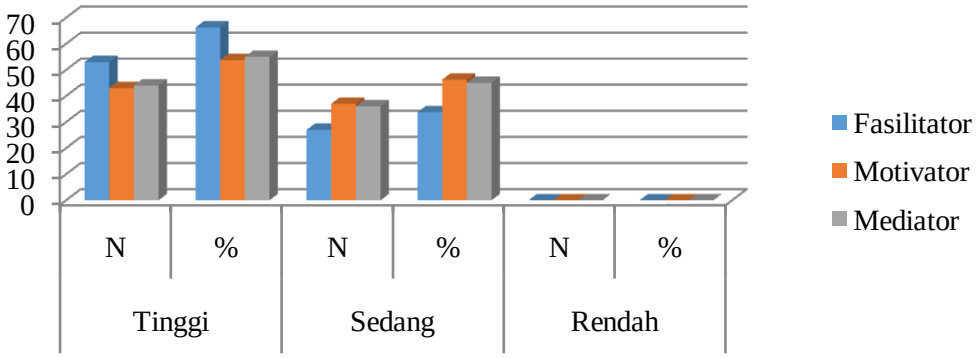
Source: The data is processed by the authors in 2019

Table 3 shows that most respondents owned farming land in narrow category (67 people), with a farming area less than 0.5 ha. Theoretically, the diminishing agricultural land and land fragmentation will affect people's interest in doing business in the agricultural sector. Narrow land affected the lower level of farming profits and inefficient use of mechanization and further increase production costs. This is in line with Iwan (2010) asthe farming area will determine the participation of farmers in their business, the extent ownership of the land will affect the farmers' interest to cultivate the land.

Roles of Extension agent

The role of Extension agents is divided into; facilitator, motivator, and mediator. Details of each extension agent's role are presented in the following figure:

Table 4. Performance of extension agent's role



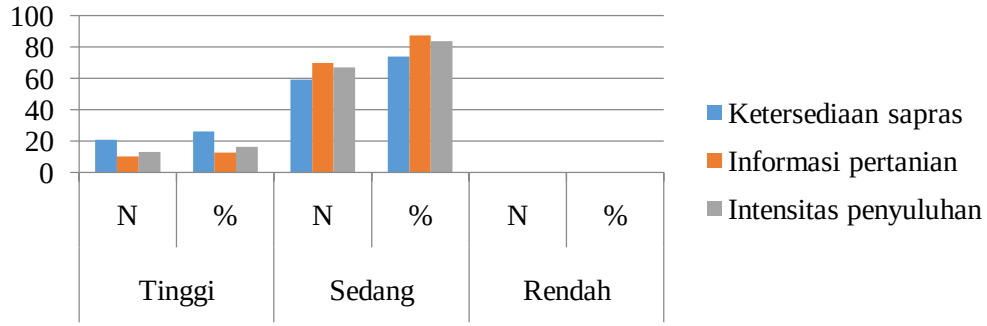
Source: The data is processed by the authors in 2019

Table 4 shows that most respondents rated the role of extension agents in high category (60 people). This is in line with the statement of Akhmad (2015), extension agents as an agent of change has a role to move, encourage and increase the enthusiasm of farmers to actively participate in group activities so that they can form the farmer's group to be a strong, independent and dynamic group.

External Factors

External factors are outside factors that could increase farmers' participation in the implementation of balanced fertilization of lowland rice such as the availability of facilities and infrastructure, availability of agricultural information and the intensity of extension activities. The results showed that most of the respondents rated external factors as medium category. Details of external factor support are presented in the following figure:

Table 5.Performance of External Factor Support



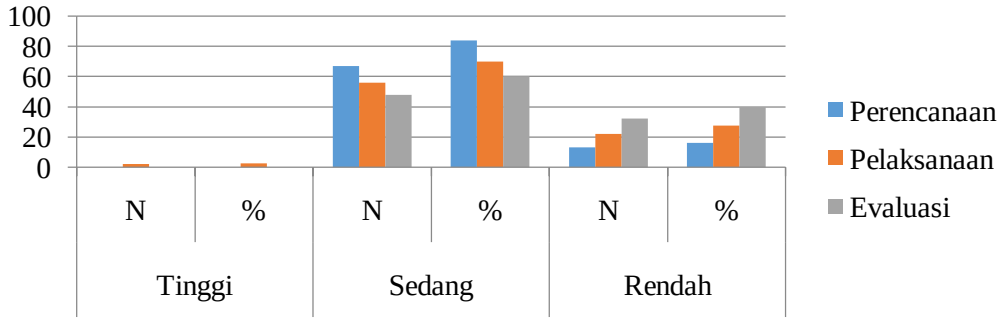
Source: The data is processed by the authors in 2019

Table 5 shows that most respondents rated external factors in moderate category (66 people). This is in line with the statement of Mulyaningsih (2018) That the better the quality of the information received by farmers will increase the participation of farmers in their farming activity. agricultural information presented in the mass media or the internet has the suitability and benefits that support the needs of farmers related to agribusiness content, environmental harmony, and appropriate technology.

Level of Farmers' participation in the Implementation of Balanced Fertilization

The results of this study indicate that participation includes three activities, namely: participation in planning, immpelentationand evaluation activities. Details of the participation of each activity are presented in the following figure:

Table6. Performance of Participation Level



Source: The data is processed by the authors in 2019

Table 6 shows that most of the respondents' participation level is in the medium category, with a number reaching 69 people (86.25%). The highest participation is obtained in planning activities (2.30), while the lowest participation is in evaluation activities (2.13). This result means that farmers still do not participate in the evaluation of balanced fertilization of lowland rice. This lack of participation can be seen from the evaluation stage of the farmers on the ability of farmers to apply balanced fertilization in lowland rice according to the recommended dosage. According to Dwiningrum (2011), there are three distinct stages of participation, namely: Participation in decision making (planning), implementation, and evaluation. If these three steps are carried out well, farmers' participation in the implementation of balanced fertilization of lowland rice could be increase.

At the planning stage, some farmers have made a good plan in the use of balanced fertilizer for lowland rice but in its implementation, farmers are often constrained by economic factors and the low availability of fertilizer in the field, especially organic fertilizer, so that planning has been constrained in realization process. At the implementation stage, farmers have participated in the use of balanced fertilizer in the cultivation of

lowland rice directly.However, the use of fertilizers based on location-specific and dosage has not been maximized.

Factors Influencing Participation

The results of the regression analysis of the study variables showed that the variables that significantly affected participation (p <0.001) are characteristic of farmers (0.024) and support of external factors (0.138), while the role of extension agents (X2) had no significant effect on farmers' participation. Details of the results for regression analysis of the independent variables on participation are presented in Table 7.

Tabel 7. Result od regression analysis

No.	Details	Unstandarized Coefficients B	Sig.	status
1.	R^2	0.533		
2.	Constant	2.109	0.000	
3.	Characteristics of farmers(X_1)	0.024	0.005	Significant effect
4.	role of extension agents (X_2)	0.052	0.218	Not significant effect
5.	external factors (X_3)	0.138	0.011	Significant effect

Source: The data is processed by the author in 2019

Table 7. shows that the influence of farmers 'characteristics and external factors on farmers' participation in the implementation of balanced fertilization of lowland rice is illustrated in the equation $\boldsymbol{Y = (2.109) + (0.024)X_1 + (0.138)X_3}$ at a significant level of 0.05, which means that the characteristics of farmers (X1) contributed the influence of 0.024 and external factors of 0.138. The equation can be interpreted; if individual farmer characteristics and external support are constant (0), then farmers' participation in the implementation of balanced fertilization is 2.109.

Effect of characteristics of the farmer on farmers' participation

Regression analysis showed that the characteristics of respondents provided a significant effect on the participation of farmers in the implementation of balanced fertilization of lowland rice, with a significance level of 0.005 with a value of the coefficient of influence of 0.024. Therefore, each increase in farmer characteristic value by one unit will increase farmers' participation by 0.024 units.

In terms of age, the results of this study indicated that 71% of respondents belong to Old category with an age range between 41 - 60 years, people who enter the old group tend to always stick with old values and they are estimated as people who difficult to accept new things. Moreover, the spirit of work for elder people tends to decrease. Therefore, they are no longer able to manage their farms properly and difficult to develop their potential. However, farmers are still productive in carrying out farming activities because of the necessity to meet their daily needs.

Most of the respondents' education level was categorized as low with dominated by elementary school graduates (78.7%). The level of education will affect the insight and understanding of agricultural information of farmers at the extension process. These results are following Ismilaili (2015) which states that education is the first key in determining the level of a person's innovation. This situation is in line with Effendy, L., and Yetsi (2018) which states that the level of education affects the motivation of farmers to improve the function of the farmer groups.

From the aspect of the area of land owned by farmers, showed that most farmers have an area of arable land less than 0.5 ha (83.7%) or in the narrow category. Theoretically, the diminishing agricultural land and land fragmentation will affect people's interest in doing business in the agricultural sector. Narrow land affected the lower level of farming profits and inefficient use of mechanization and further increase production costs. This is

in line with the statement by Iwan (2010) who stated that the farm area will determine the participation of farmers in their business, the extent ownership of the land will affect the farmers' interest to cultivate the land. These results are consistent with a study by Effendy, L and Thopan (2012) that concluded that the characteristics of individual farmers affect their participation in improving the ability of the farmers' group. Thus, this study concluded that increasing the participation of farmers in the implementation of balanced fertilization of lowland rice might be done with special regard to the characteristics of farmers in carrying out the extension process, these characteristics are; age, formal education level, farm area, and role of extension agents.

Effect of External Factors on Farmers' Participation

The results of the regression analysis showed that external factors significantly affected the participation of farmers in the implementation of balanced fertilization of lowland rice with a significance level of $p < 0.011$, with a coefficient of influence of 0.138, indicated that any increase in the value of an external factor of one unit would increase farmers' participation by 0.138. The calculation of the average score showed that external factors included in the medium category with an average score of 2.88. The highest average score (2.93) was obtained by the availability of facilities and infrastructure, while the lowest was the factor of agricultural information availability by 2.79. Therefore, support of external factors was dominated by the availability of facilities and infrastructure and the intensity of agricultural extension activities.

These findings showed that the higher the availability of production infrastructure and the intensity of extension, the greater the level of farmers' participation in the implementation of balanced fertilization of lowland rice. This is in line with Effendy, L and Thopan (2012) which concluded that factors from outside the group determine the participation of members in increasing the ability of the group. A similar result was stated by Mustakim (2015) that the intensity of agricultural extension is very important in the process of technology adoption, the more often agricultural extension is carried out, the greater the success of agricultural extension can be achieved. Thus, this study concluded that increasing farmers' participation in the implementation of balanced fertilization of lowland rice could be done by increasing the support of external factors through the availability of agricultural information and the intensity of agricultural extension.

Models and Strategies for Increasing Participation

The analysis shows that the participation of farmers in implementing balanced fertilization of lowland rice is still low. Therefore, we need a model and strategy to increase participation to achieve high and maximum production targets and to improve the welfare of farmers' families. The extension model is shown in Figure 2. The agricultural extension model is as follows:

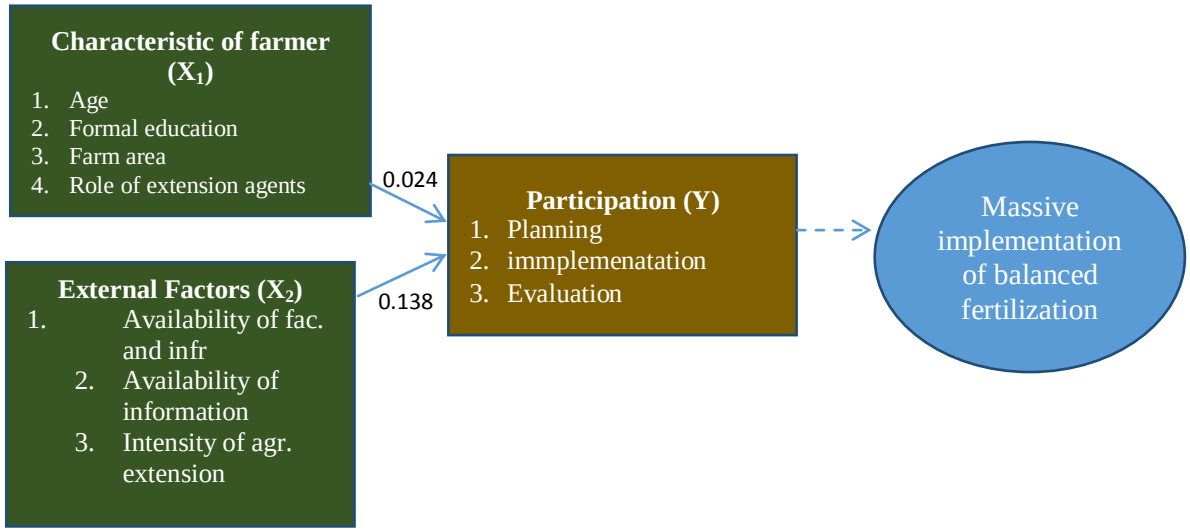


Figure 2. Factual Model of Increasing Participation

Based on Figure 2, increasing participation of farmers in the implementation of balanced fertilization technology for lowland rice could be achieved with strategies : (1) conducting more intensive extension activities by paying attention to the characteristics of farmers in conducting extension such as; age, formal education level, farm area, and extension role; (2) increasing support for external factors by facilitating easy access to information and maximizing agricultural extension activities related fertilization

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IV. CONCLUSION AND RECOMMENDATION

Conclusion

Based on the description of the results and discussion, the following conclusions are obtained:

1. Farmers' participation in the implementation of balanced fertilization of lowland rice in Cikoneng sub-District, Ciamis District was in the medium category with an average value of 2.24.
2. External support (X_2) and characteristics of farmers (X_1) had a significant effect ($p < 0.005$) on farmers' participation in the implementation of balanced rice fertilization technology, with coefficients of 0.138 and 0.024, respectively.
3. Strategies to increase farmers' participation in the implementation of balanced fertilization of lowland rice; (1) facilitating farmers to participate in agricultural extension and training activities to increase farmers' participation in the implementation of balanced fertilization of lowland rice; (2) facilitating easy access to agricultural information for farmer groups and maximizing extension activities that have been planned together with farmer groups.

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Appendix

OUTPUT ANALISYS

Reliability Statistics

Cronbach's Alpha	N of Items
.964	45

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.730[a]	.533	.515	.03711	.533	28.922	3	76	.000	1.900

a. Predictors: (Constant), X3, X1, X2
b. Dependent Variable: Y

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.119	3	.040	28.922	.000[b]
	Residual	.105	76	.001		
	Total	.224	79			

a. Dependent Variable: Y
b. Predictors: (Constant), X3, X1, X2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	2.109	.100		21.089	.000	1.910	2.308			
	X1	.024	.008	.296	2.863	.005	.007	.041	.610	.312	.224
	X2	.052	.042	.182	1.243	.218	-.031	.135	.659	.141	.097
	X3	.138	.053	.351	2.622	.011	.033	.243	.663	.288	.206