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Increasing Capacity of Rice Farmers through the Role Agricultural Extension

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Abstract. Agricultural extension agents are agents of change who are directly related to farmers The purpose of the extension is to change the behavior of farmers in terms of knowledge, attitudes, and skills so that farmers have a more prosperous life. Rice farmers in West Tojo District carry out farming activities that still rely on hereditary habits, causing farmers to lack the capacity to run food crop businesses, both technically in cultivation, harvesting, and marketing. The objectives of the study are (1) to determine the level of capacity of rice farmers in Kabalo Village Tojo Una-Una District and, (2) to determine the effect of the role of extension agents on increasing the capacity of rice farmers in Kabalo Village Tojo Una-Una District. This research was conducted from March 2020 to August 2020 in Kabalo Village West Tojo District Tojo Una-Una Regency. This study used a population sample of 56 rice farmers. Based on the results of this study, the role of agricultural extension agents had an effect on the success rate of rice farmers in Kabalo Village. Through increasing the role of extension workers, both facilitators, motivators, mediators, advisors, and communicators, could increase the capacity of farmers in managing capital, utilizing technology, labor, and marketing processes that benefit farmers.

Keywords: agricultural extension, capacity, rice farmers

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1. Introduction

Kabalo Village is one of the areas in West Tojo District that produces rice. This village is estimated to have started producing rice or cultivating rice since the 1980s and this commodity was made the main commodity by farmers. Along with the rice problem in Indonesia, the decline in the amount of production continues to cause people who originally worked as rice farmers to switch professions to become traders, construction workers, and corn farmers.

The low capacity of farmers in cultivating, harvesting, post-harvesting, and marketing has resulted in traditional rice farming activities in Tojo Barat District. Rice production in West Tojo District is 2.151 tons or 0.23% of the total production in Central Sulawesi [1]. Rice farming requires seriousness and it is better to apply the right farming pattern, this is related to

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the capacity needed by farmers in land cultivation and farming cultivation techniques. Agricultural development in Indonesia is still constrained by the low capacity of farmers, this has an impact on the difficulty of farmers in improving their welfare [2], [3].

Agricultural extension becomes a non-formal education system that can be provided to farmers and their families to change their behavior to better farming, living, community, and environment. Extension agents as agents of change are certainly needed in increasing the capacity of farmers as facilitators, motivators, mediators, advisors, and communicators. Extension officers as people who can help farmers, so that farmers are willing to participate in farming activities, people who can hear and understand farmers' aspirations, can provide support, and can motivate farmers [4]-[6].

Agricultural extension agents are agents of change who are directly related to farmers. Its main function is to change farmer behavior through non-formal education so that farmers sustainably have a better life. Extension agents can influence targets in their roles as motivators, educators, dynamists, organizers, and communicators. Agricultural extension is a service system that helps the community through the educational process in implementing farming techniques and methods to increase production to be more successful to increase income. The agricultural extension process is expected to increase the capacity of farmers [7], [8].

Based on the introduction, the objectives of this study are (1) to determine the level of capacity of lowland rice farmers in Kabalo Village, Tojo Una-Una District. (2) Knowing the effect of the role of extension workers on increasing the capacity of lowland rice farmers in Kabalo Village, Tojo Una-Una District.

2. Research Method

This study used a survey method, with a descriptive analysis approach and a quantitative paradigm equipped with information based on existing qualitative data in the field to support and sharpen quantitative analysis. The data collected in this study include primary data and secondary data. Primary data is the main data that must be fulfilled to answer problems to achieve research objectives. Primary data in this study were obtained directly from respondents through structured interviews using questionnaires to respondents and in-depth interviews with several selected respondents, as well as from documents provided secondary data. Secondary data is data obtained by researchers from existing sources.

The population of this study was rice farmers in Kabalo Village West Tojo District Tojo Una-Una Regency. The number of rice farmers in Kabalo Village is 129 farmers. The sampling technique used in this study was the Slovin formula with an error rate of 10% and 56 farmers were obtained as respondents. The Slovin formula is commonly used in survey research where

the sample size is usually very large, so a formula is needed to get a small sample but can represent the entire population [9].

The measurement results, especially the ordinal scale data, are converted into an interval scale or even a ratio scale so that it is feasible to be tested using parametric statistics. The measurement results for a statistical test, and so that all data collected in the study have the same value range, namely 0-100, a transformation process is carried out. The transformation guideline is the smallest index given for the lowest total score and the 100 highest total scores for each indicator [5], [6], [10]-[12]. The transformation formula used in the study is as follows:

Indicator transformation index

$$Transformation\ Index = \frac{Number\ of\ Scores\ Achieved\ -Minimum\ Score\ Amount}{Maximum\ Score\ Amount-Minimum\ Score\ Amount}\ x\ 100 \quad (1)$$

Normalized indicator transformation index

$$Transformation\ Index = \frac{Indicator\ Transformation\ Index}{Average\ score} \quad (2)$$

The low capacity of farmers makes it difficult for farmers to improve their welfare. Farmers are expected to have a high capacity as capital in increasing their productivity. The capacity in question includes aspects of knowledge, attitudes, and skills. Extension workers are needed in increasing the capacity of farmers and their roles as facilitators, motivators, mediators, advisors, and communicators. Therefore, it is necessary to research to find out what factors influence the capacity building of rice farmers (Figure 1).

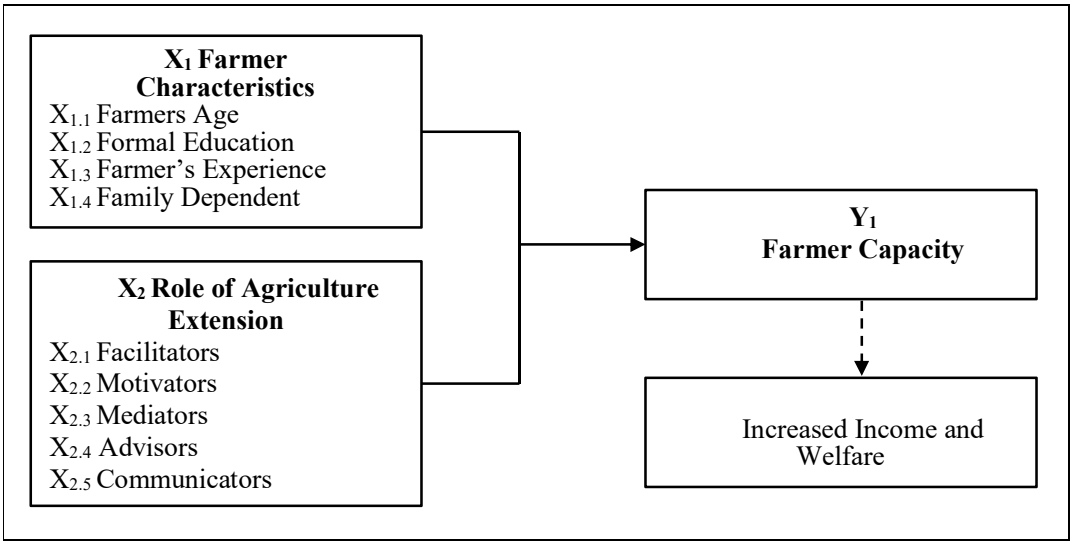

Figure 1. Factors That are Thought to Increase the Capacity of Farmers in Kabalo Village Tojo Una-Una Regency

Multiple linear regression analysis is used to determine the effect of farmer characteristics (X_1), the role of extension workers (X_2) on the increase in farmer capacity (Y). Multiple linear regression is summarized as follows:

$$Y = a + b_1X_1 + b_2X_2 + e \quad (3)$$

where: Y = farmer capacity; X_1 = farmer characteristics; X_2 = the role of agricultural extension; a = constant; e = error; $b_1 \ldots b_n$ = estimation coefficient

3. Results and Discussion

3.1. Farmer Characteristics

Internal characteristics are all things that have to do with farmers who are still active in doing their farming. Internal characteristics or characteristics of lowland rice farmers in Kabalo Village include the age of the farmer, formal education, farming experience, and number of family dependents (Table 1).

Table 1. Characteristics of Rice Farmers in Kabalo Village Tojo Una-Una Regency

Characteristics of Rice Farmers	Rice Farmers	
	Total Farmers	Percentage (%)
Farmers Age (Years)		
Young (26 – 41)	12	21
Adult (42 – 57)	36	64
Old (58 – 73)	8	14
Total	56	100
Average		48
Formal Education (Years)		
Low (6 – 10)	30	53
Middle (11 – 14)	24	43
High (15 – 18)	2	4
Total	56	100
Average		10
Family Dependents (Person)		
Low (0 – 2)	9	16
Middle (3 – 5)	47	84
High (6 – 8)	0	0
Total	56	100
Average		3
Farmers Experience (Year)		
Low (8 – 18)	22	39
Medium (19 – 29)	32	57
Long (30 – 40)	2	4
Total	56	100
Average		19

Source: Research Data Processed in 2020

The productive age provides opportunities for farmers to be actively involved in cultivating farming [13]. Age affects farmers' skills in managing rice farming. This is because physical ability is needed during the lowland rice cultivation process. The results showed that the age of rice farmers in Kabalo Village was classified as productive. In the category of productive age, farmers are easier to be creative, stronger, and more dynamic in following technological developments and agricultural advances.

The population age is divided into three groups, namely the young group, under 15 years, the productive age group, 15 - 64 years, and the old age group 65 years and over [14]. The older the

farmer (over 50 years), usually the slower the adoption of technology, and the cultivation process tends to be carried out from generation to generation [10], [15].

Formal education is one aspect that determines a person's ability and way of thinking in managing his business. The higher the formal education of the respondents, the broader their knowledge and insight and the more rational their way of thinking will be. In addition, education is also one of the factors that can determine and stimulate a person to be creative and innovative in solving any problems related to the business they are engaged in [16], [17].

The formal education of rice farmers in Kabalo Village is in a low category, namely 6-10 years with a percentage of 53%. The formal education of rice farmers in Kabalo Village is in a low category, namely 6-10 years with a percentage of 53%. The level of education can influence the response of farmers to the presence of technological innovations. Farmers who have a higher level of education have a better ability to understand and apply productive technology so that their productivity is high [18].

The level of farming experience that farmers have indirectly affects the mindset. Experience can be given to other farmers to be used and become lessons learned in pursuing the success of their farming [3]. Based on Figure 1, the experience of lowland rice farming in Kabalo Village is in the medium category, namely 20–31 years, and is in the fairly experienced category. Farming experience plays an important role in increasing farmer competence. Work experience affects knowledge and expertise in a field of work. The longer a person's work experience, the more skilled that person is in their field of work [19][20].

The number of family dependents is the number of members of the rice farmer family consisting of wives, children, and other people who participate in the family that is the responsibility of the head of the family. The number of family members affects the level of work of the farmer. The results showed that the number of dependents of farmer families in Kabalo Village was in the medium category, namely 3-5 persons with a percentage of 84%. Furthermore according to farmers the greater the number of dependents, the greater the costs incurred for consumption so that the smaller the funds that can be allocated for farming costs.

The number of farmer family members affects farmer planning because the farmer family members are a source of labor in their farming activities [21]. According to farmer A.E (53 years), the more family members, the higher the expenditure, the more the income tends to be for life's needs. However, more household members who are active in farming activities have the opportunity to get a higher income.

3.2. The Role of Agricultural Extension

An extension worker must live and adhere to the basic philosophy of extension, namely: (1) extension is an educational process, (2) extension is a democratic process, and (3) extension is a continuous process. Contains a philosophy of helping people or farmers so that people can help themselves in dealing with various problems in farming through education which aims to improve their welfare [5]. The role of extension workers has an important role in the success of farmers in cultivating farming. The role of extension workers is expected to be able to improve the standard of living of farmers and their families. The success of extension depends on how big the role of the extension agent [3], [10], [22].

In this study, the role of the instructor was measured based on the extension's ability to carry out his role as facilitator (the ability to facilitate farmers or farmer groups to make farming plans and facilitate farmers to cultivate farming well), a motivator (encourage farmers to continue to increase their productivity), mediator (the ability of the extension worker to be impartial to other interests while looking for various possible solutions to problems without resorting to breaking or forcing a solution), advisor (the ability to provide suggestions for solving problems faced and remain open to problems faced by farmers), and communicator (the ability to provide information that is easily understood by farmers about rice farming).

The results showed that the role of extension workers as facilitators, motivators, mediators, advisors, and communicators were all in the medium category. This indicates that all of the agricultural extension's duties to meet the needs of information and other farming are running well (Table 2).

Agricultural extension workers should be able to increase partnerships or cooperation with the private sector, banks, and industry to increase the availability of capital and markets that benefit farmers. The role of the extension agent is as a provider of facilities and infrastructure, as a provider of information, and as a bridge to connect innovations to farmers [22]-[24]. According to farmer R.U (40 years), extension workers often assist them in developing rice farming in the form of assistance in planting time and regular counseling in overcoming pests and limited fertilizers at the farmer level.

Motivators are the ability to assist farmers in increasing the effectiveness of farmer groups in increasing farmers. The results showed that the role of the instructor as a motivator was in the medium category with a percentage of 75%. This shows that the agricultural extension officers have implemented sufficient actions that can motivate farmers to participate in farming to increase agricultural production. One of the efforts to motivate someone is to help expand the individual's thinking, by first arousing his enthusiasm. A motivator that should be done by extension workers is to motivate farmers to always be enthusiastic in running their farms, encouraging them to be active in organizations such as farmer groups or farmer group

associations. The presence of instructors as an encouragement to farmers in advancing farming and developing farming is certainly needed [6], [10], [25].

Table 2. The Role of Agricultural Extension Worker's in Kabalo Village Tojo Una-Una Regency

Role of Agriculture Extension	Rice Farmers	
	Total Farmers	Percentage (%)
Facilitators		
Low (0-50)	25	45
Middle (50.01-75)	26	46
High (75.01-100)	5	9
Total	56	100
Average		57
Motivators		
Low (0-50)	10	18
Middle (50.01-75)	42	75
High (75.01-100)	4	7
Total	56	100
Average		60
Mediators		
Low (0-50)	4	7
Middle (50.01-75)	47	84
High (75.01-100)	5	9
Total	56	100
Average		60
Advisors		
Low (0-50)	0	0
Middle (50.01-75)	53	95
High (75.01-100)	3	5
Total	56	100
Average		64
Communicators		
Low (0-50)	1	2
Middle (50.01-75)	48	86
High (75.01-100)	7	13
Total	56	100
Average	67	

Source: Research Data Processed in 2020

Encouragement for farmers to always try and even create innovations related to the farming fields they are engaged in also encourages them to create other businesses. According to farmer K.K (37 years), extension workers usually motivate farmers to cultivate rice to the fullest. Usually, the extension worker visits the farmer 3 (three) times a month. Extension workers usually encourage simultaneous planting and sometimes conduct training in pest and disease control.

The presence of extension workers in the process of solving problems among fellow farmers is certainly needed, cooperation between farmers can be increased and the commodities that are cultivated have increased [10]. The mediator is the ability to help extension workers to be neutral with farmers in the negotiation process to find various possible solutions to problems without using methods to decide or force a solution. The role of agricultural extension agents as mediators is also a task that can be carried out by agricultural extension agents in providing

information and connecting farmers with sources of information to solve the problems at hand. The role of extension workers as mediators is in the high category with a percentage of 84%, this shows that extension agents in Kabalo Village are often neutral towards farmers in the negotiation process to find various possible solutions to problems. Based on observations and according to farmer S (53 years), extension workers often work with farmers to solve the problem of rats and the difficulty of getting fertilizers.

The role of the extension worker as an advisor, the extension worker has the skills and expertise to choose the right alternative for change. In addition, an extension worker can play a role in serving, providing guidance, and solving a problem that is being faced by farmers [26]. Based on observations and according to farmer Y (51 years), extension agents are good advisors to farmers and always provide input on the development of lowland rice farming. Extension workers are also usually involved in solving rice farming problems such as pests and plant diseases, but they are also usually unable to solve problems faced by farmers, especially in terms of marketing. The advisor is the ability to provide suggestions for solving problems faced and remain open to problems faced by farmers. The results showed that the average advisor was in the high category with a percentage of 95%, this shows that the extension workers in Kabalo Village often provide suggestions for solving problems faced by farmers.

Agricultural instructors act as teachers, mentors, advisors, informers, and farmer partners [24]. Extension officers can provide information that is easy for farmers to understand. The results showed that the role of extension workers as communicators was in the high category with a percentage of 86%, this shows that extension workers in Kabalo village often provide information that is easily understood by farmers. Based on observations and according to M.R (48 years), one of the information that is often conveyed by extension agents is the importance of joining a farmer group.

3.3. Rice Farmers Capacity Level

Capacity is the farmer's ability to think, consider, decide and try for the best in farming development for the sake of increasing farm productivity. Capacity building takes into account the resources and needs of farmers. Measured based on the farmer's ability to manage capital, labor, technology, and marketing (Table 3).

Capital is the main asset of farmers in running a managed farm, generally in the form of funds or money. With money, farming can run smoothly and support the production process to marketing. The results showed that the average capital was in the high category with a total percentage of 66%. Based on observations and according to farmer F.A (36 years) in general, farmers in farming use their own capital, these farmers have difficulty in obtaining capital when they cannot obtain loans. Usually, the capital is used to buy fertilizers and pesticides.

Table 3. Capacity of Farmers in Kabalo Village Tojo Una-Una Regency

Farmers Capacity	Rice Farmers	
	Total Farmers	Percentage (%)
Capital		
Low (0-50)	3	5
Middle (50.01-75)	37	66
High (75.01-100)	16	29
Total	56	100
Average		69
Labor		
Low (0-50)	7	13
Middle (50.01-75)	47	84
High (75.01-100)	2	4
Total	56	100
Average		60
Technology		
Low (0-50)	10	18
Middle (50.01-75)	44	79
High (75.01-100)	2	4
Total	56	100
Average		58
Marketing		
Low (0-50)	11	20
Middle (50.01-75)	37	66
High (75.01-100)	8	14
Total	56	100
Average		61

Source: Research Data Processed in 2020

Capital is a complex requirement because it relates to spending decisions in business activities to increase income and achieve maximum profit. Lack of capital can make it difficult for businesses in this sector to develop [27], [28]. The results showed that the average workforce was in the high category with 84%. According to A.J (60 years), it is more effective to use labor outside the family because the work is done faster and on time. Usually use 15 workers outside the family from the process of planting to harvesting. The average wage or salary given is IDR 80.000 per day. The results of the research on average farmers working in the field of agriculture choose labor not based on expertise or skills but availability. The increase in the amount of production increases the required workforce, so that income also increases [10], [22], [29].

The ability of farmers to know, master, understand, and implement technical rules of farming management will increase the independence and success of farmers [30]. Technology is a whole means to provide goods needed for the survival and comfort of human life and is a tool used by farmers daily to facilitate the management of farming to achieve maximum results to improve their welfare Technology is also one of the determining elements that have an important role in the production process.

The results showed that the average use of technology was in the high category with 79%. Based on observations and according to farmer M.G (50 years old), most of the farming

processes use technology because according to them, using agricultural tools their production yields increase. For example such as the use of hand tractors, and combine harvesters or Odong-Odong. Marketing is identifying and meeting human and social needs [31]. The results showed that the average farmer marketing process was in the medium category with 66%. According to M.I (42 years old), on average, farmers market their produce in the form of rice instead of unhulled rice. Rice varieties and simultaneous harvests in the Kabalo Village area affect the selling price at the farmer level.

3.4. Factors Affecting the Capacity of Rice Farmers in Kabalo Village

Farmer's capacity (Y_1) is influenced by Internal Characteristics (X_1) and the Role of Agricultural Extension (X_2). Based on the multiple regression analysis tables, the factor that has a very significant effect on farmers' capacity is the role of the extension worker (X_2).

Table 4. The Regression Coefficient of Internal Characteristics and the Role of Agricultural Extension Workers on Increasing the Capacity of Rice Farmers in Kabalo Village Tojo Una-Una Regency

Indicator	Rice Farmers' Capacity		
	Regression Coefficient	**t**	**Sig.**
Constant	0.467	3.578	0.001
Farmer's Age (X_{11})	-0.003	-1.521	0.135
Formal Education (X_{12})	0.006	0.974	0.335
Family Dependents (X_{13})	0.007	0.459	0.648
Farmer's Experience (X_{14})	0.003	0.884	0.403
The Role of Extension (X_2)	**0.561**	**5.415**	**0.000****
R^2			0.430
F_{value}			7.551
Sig			0.000

Note: ** Significant at $\alpha = 0.01$ level

Source: Research Data Processed in 2020

The regression equation for internal characteristics and the role of extension workers in increasing the capacity of rice farmers are as follows:

$$Y_1 = 0.467 - 0.003\ X_{11} + 0.006\ X_{12} + 0.007\ X_{13} + 0.003\ X_{14} + 0.561\ X_2 \quad R^2 = 0.430$$

Based on this equation, the constant value is 0.467 and the role of the extension agent is 0.561. Based on the calculation of multiple linear regression analysis, the R^2 coefficient of 0.430 is obtained, this means that 43% of farmer capacity (Y) can be explained by the variables of farmer characteristics and the role of agricultural extension workers, while the remaining 57% is explained by other variables not included in the equation.

The role of extension workers has a significant effect on increasing the capacity of farmers. This shows that the increasing role of extension workers can increase the capacity of farmers in farming both in utilizing capital, labor, application of technology, and mutually beneficial marketing processes. Extension workers have carried out their duties well to meet the needs of farmers, when farmers' needs are met, the capacity of farmers will increase.

Capacity is often related to capability and performance. Capacity building is the main thing and it should be an agricultural development program. The process of building community capacity cannot happen all at once because of the ability of farmers to cope with change and dynamics. Capacity is generally defined as the ability possessed by a person to properly carry out his functions effectively, efficiently, and sustainably [32]-[34]. Capacity building is very much needed in developing better rice farming. Through increasing the capacity of rice farmers in managing capital, labor, technology, and marketing, the income and welfare of lowland rice farmers can be increased. To develop the capacity of farmers, an extension worker must be able to understand the needs and resources they have. An extension worker must have the ability to analyze and examine in depth the problems and whereabouts of farmers [3], [10]. When the role of extension workers goes well, farmers individually and collectively can face problems in the implementation of their farming activities and can find solutions so that they can improve their welfare in a better direction.

4. Conclusion and Recommendation

Characteristics of farmers, both age, level of formal education, experience and number of dependents have no significant effect on increasing farmer capacity. The role of agricultural extension workers has an important role in increasing the capacity of farmers. Through increasing the role of extension workers as facilitators, motivators, mediators, advisors, and communicators, farmers can improve their ability to manage farming capital well, utilize technology according to farmers' needs, labor, and marketing processes that are profitable for farmers. Increasing the role of extension workers is an important factor that needs to be taken into account by both the government and the extension workers themselves. This role can be carried out by increasing the intensity of meetings with farmers, training, and making demonstration plots that are beneficial for farmers. With the capacity of farmers, the production and income of farmers can be increased. The weakness of this research is that it does not include the variable of the extension worker's competence. Therefore, it is necessary to conduct further research on extension workers in Tojo Una-Una district.

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