

# The Role of Agricultural Extension in Increasing Competence and Income Rice Farmers

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**Abstract.** The success of agricultural development in Indonesia in developing the ability of farmers is inseparable from the role of extension services carried out professionally. This study aims to (1) Analyzing the level of farmers' perceptions about the role of extension workers in improving the competence of rice farmers in Tayawa Village, and (2) Analyzing factors that influence the level of farmers' perceptions about the role of extension workers in increasing the competence of rice farmers in Tayawa Village. This research uses a survey method with a descriptive analysis approach and a quantitative paradigm, supplemented with qualitative data information to support and sharpen quantitative analysis. The level of competence of middle rice farmers tends to be low, due to the weak role of agricultural extension workers. The role of the instructor as a communicator, facilitator, educator, and communicator turned out to have a positive effect on increasing the competence of rice farmers. But now these factors tend to be low so that it is still lacking in efforts to increase the competence of rice farmers.

**Keywords:** competence, extension, farmers, income

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## 1. Introduction

The success of agricultural development in Indonesia in developing the ability of farmers is inseparable from the role of extension services carried out professionally. History proves that through agricultural field extension, Indonesia succeeded in achieving food self-sufficiency in 1984. Also, the number of rice farmers as extension targets was not proportional to the number of extension workers in the field at present. Agriculture Ministry states that around 68% of the government employees aged over 50 years old and even about 50% have entered retirement age [1]. The period of 2001 to 2016 government employees decreased by 25%, due to retirement, transfer of job functions, and reduced appointment of extension workers by the government.

This is a major obstacle in carrying out the extension process which results in a lack of application of extension philosophy *to help people to help themselves through educational means to improve their level of living* or help the community help themselves (independently) by interpreting

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education (non-formal) as a means to improve their standard of living. In the Netherlands, the United Kingdom, the United States, Japan, Australia, and Taiwan, the decrease in the number of government extension agents was taken over by private extension agents and independent extension agents. Even farmers are willing to pay for a counseling service that they previously got free. This proves that counseling has advantages and farmers, especially rice farmers, need extension workers [2] [3].

Extension agents still consider implementing tools or government projects that must comply with requests from officials. Farmer leaders, group leaders, and government employees, including self-help instructors, are only assistants or program implementers. If seen from the Undang-Undang No. 16 Tahun 2016 about Sistem Penyuluhan Pertanian, Perikanan dan Kehutanan (SP3K), extension agents as facilitators and interested parties for the main assistance and business actors so that extension agents must be free from institutions such as regional offices. The performance of agricultural instructors, especially independent extension workers, is the desire of every farmer. Farmers who have low incomes or are shackled by poverty are attributes that support agriculture still need attention to improve the competence of farmers and seek rice farming that benefits farmers. Through the extension of farmers are expected to provide information and support agriculture so that their farming can be sustainable [4].

The problem in this research is the extension role in supporting the improvement of competence and income of rice farmers in Tayawa Village. This is a rice commodity which is the mainstay sector of Tojo Una-Una Regency. (1) how the role of extension agents in increasing the competence and income of rice farmers in Tayawa Village, and (2) what factors influence the ability of rice farmers.

## **2. Research Methods**

This research uses a survey method with a descriptive analysis approach and a quantitative paradigm, supplemented with qualitative data information to support and sharpen quantitative analysis. Types of research that uses quantitative paradigms are types of research to describe, examine the relationships and influences between variables, and refer to what has been previously formulated [5]. Thus survey research is research that takes samples from one population and uses a questionnaire as a data collection tool. This research will be carried out in the area of rice commodity centers in Tayawa, which is fostered by extension agents. The location of this study was chosen deliberately (purposive) because it has a large production and is a center of rice plants in the Tojo Una-Una Regency, Central Sulawesi. The research was conducted from March to November 2019. The population in this study were all rice farmers who live in Tayawa Village. The number of rice farmers who are fostered by extension agents is 50 farmers.

Primary data was collected using an instrument consisting of a questionnaire with structured interview guidelines. Open question. Closed question. Closed questions are questions that have been asked. Questions asked by respondents still choose accordingly. Open questions are questions that allow respondents to answer free questions to ask closed questions. The data obtained is the first carried out of the transformation process.

Indicator transformation index

$$\text{Transformation Index} = \frac{\text{Number of Scores Achieved} - \text{Minimum Score Amount}}{\text{Maximum Score Amount} - \text{Minimum Score Amount}} \times 100$$

Normalized indicator transformation index

$$\text{Transformation Index} = \frac{\text{Indicator Transformation Index}}{\text{Average score}}$$

The transformation guideline is the index value given for the lowest number of scores and the value of 100 the highest number of scores for each indicator. The number of indicators for each variable is not the same, so the total value of the rating is equal to the total score of the parameters of each indicator the number of each parameter corresponds to the largest score multiplied by the number 100 [6]. Multiple linear regression analysis through Statistical Package for Social Sciences (SPSS) version 20 was used to analyze each variable for each to increase exchange and farmers.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e \quad (1)$$

where:  $Y$  = Role of extension workers (Score);  $X_1$  = Farmers age (Year),  $X_2$  = Formal education (Frequency);  $X_3$  = Non formal education (Frequency);  $X_4$  = Rate of Cosmopolitan (Frequency);  $X_5$  = Land area (Hectare);  $X_6$  = Farmer's Experience (Year);  $a$  = Constant;  $e$  = Error standard;  $b_1...b_n$  = Estimation Coefficient

### 3. Results and Discussion

#### 3.1. Farmer Characteristics

All Respondent characteristics include farmer age, formal education, non-formal education, cosmopolitan level, land area and farmer experience. These characteristics are the characteristics of each respondent figure 1. States that the characteristics of farmers are important in determining changes in farming.

Respondents in this study are farmers who directly manage rice farming and interact with extension workers and other farmers all the time. Most aged between 38 and 49 years (52.3%) were categorized as young (Figure 1). The age of the respondent is the length of the respondent's

life until the study was conducted. At that age are classified as productive periods for someone to participate in various activities including extension. The level of opportunity for success and success in extension is greater for the future. These results are by the research that respondents who are at a productive age have good abilities. Good physical condition, so they can carry out activities optimally and still be able to develop themselves [7].

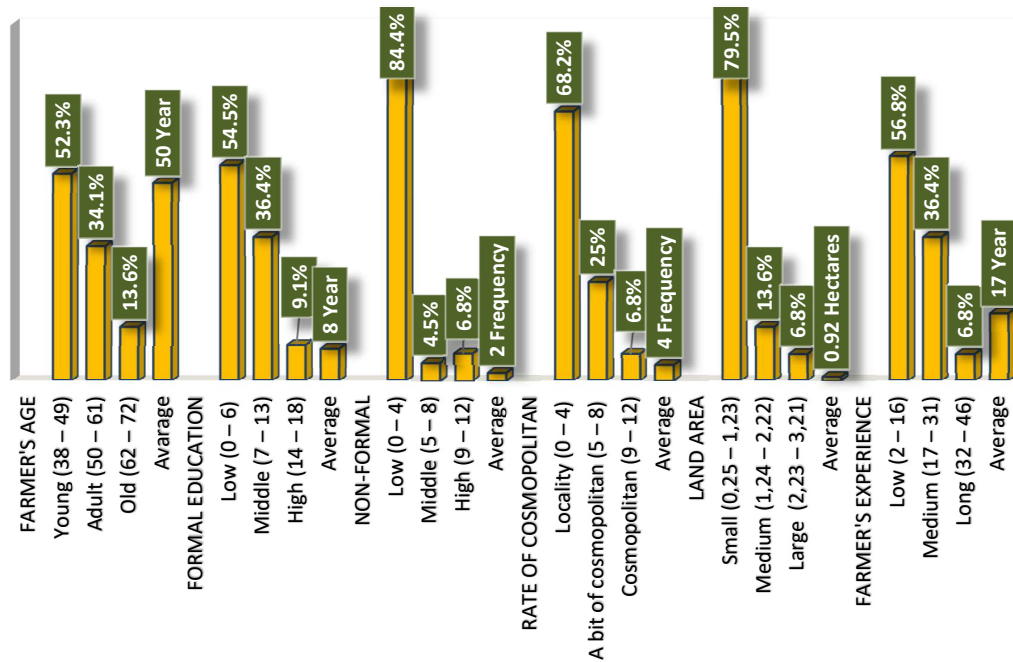


Figure 1. Distribution, Number and Average Characteristics of Rice Farmers

Education is a learning activity that is followed in school. The education of respondents was in the low category of 8 years or graduated from elementary school (Figure 1). This shows that respondents who have a low level of education generally do not continue to the next level because of financial difficulties. Respondents in the high category assume that schools are sufficient up to high school and do not need to go on to college because in the future they will help their parents cultivate rice fields or other plantation lands such as coconut, corn, and cocoa. The low level of education has reduced the ability of farmers to process rice fields, especially in absorbing the information conveyed. Information conveyed mainly from extension agents must be explained simply so that it is easily understood by farmers. This is in line with research by the low level of education of farmers enables farmers to be less able to find and consider the needs needed in developing farming [8].

Non-formal education in the form of activities on cultivation techniques, training in making compost, making vegetable pesticides, and controlling pests and diseases. Based on the intensity of attending non-formal education through extension, it is classified as low, namely twice a planting season. Extension that followed was generally held by local government agencies. The agency is the Agricultural Extension Center or Balai Penyuluhan Pertanian (BPP), private extension workers, and the Tojo Una-Una District and Provincial Agriculture Services. This

explains that counseling at the level of rice farmers is not going well. The low level of non-formal education that has been followed has an impact on the low information obtained by farmers in handling the problem of pest attack and waste utilization.

Cosmopolitan is one's ability to deal with the wider environment. Respondents in this study had a cosmopolitan locality level of 68.2% or four times the planting season figure 1. This is due to the lack of willingness of farmers to seek information from other villages, extension workers, the District Agriculture Office, Agricultural Extension Centers, and traders. Less interaction with the outside environment makes farmers less informed. Farmers can not hear much input from others, especially regarding rice farming. Also, the lack of intensity of interacting with the outside world makes farmers less innovative in terms of meeting business needs and consumer demands. States that cosmopolitan farmers can be seen from the attitude that is easy to find out and is open to any information relating to the farming being cultivated.

Land cultivated by rice farmers is classified in the narrow category medium 0.25–1.23 Ha with an average of 0.92 Ha figure 1. The land tenure is in one location and more than one location. This land area is used by all farmers to carry out rice cultivation. Rice planting activities are generally carried out throughout the year. Rice planting is done twice a year because it is supported by semi-technical irrigation in Tayawa Village. Field observations showed that farmers owned other land and were used for clove, coconut, maize, cacao, and chili plantations. Also, it was found in the field that larger farmers' land had cleaner conditions than narrow farmers' land. This is due to farmers whose wider land can hire workers to clear weeds, but do not hand over all work to workers but they also take care of the land.

Respondents' experience in the business in this study is 2–16 years with a percentage of 56.8% which is categorized as low. The average rice farmer has been working for farming for 17 years. The experience of farming tends to influence the decisions taken by farmers in subsequent farming activities. Most of the rice farmers are cocoa and corn farmers. There are some of the respondents of this study who have experience cocoa farming longer than rice farming. The results of observations in the field show that there are differences in the way of farming between farmers starting a business earlier than farmers who are just starting a business. Farmers whose farming experience is longer have better adaptability, for example, if they experience a decrease in production in the previous year, then they are faster to take action to improve their farming practices. Also, they are more actively seeking information to develop their farming business, they do fertilization and maintenance on time, so that the land they are working on is cleaner, better maintained, and has higher production. States that experience is very valuable for farmers and the experience itself can be given to other farmers to be used as well as learning in the success of farming.

### 3.2. The Role of Agricultural Extension Workers

The role of extension workers is position or status in carrying out extension activities. The role of instructors is seen from the aspect of roles as communicators, facilitators, educators, and organizers in figure 2. States the role of extension workers to be an important element in the success of farmers in the farming business. 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 the farmer.

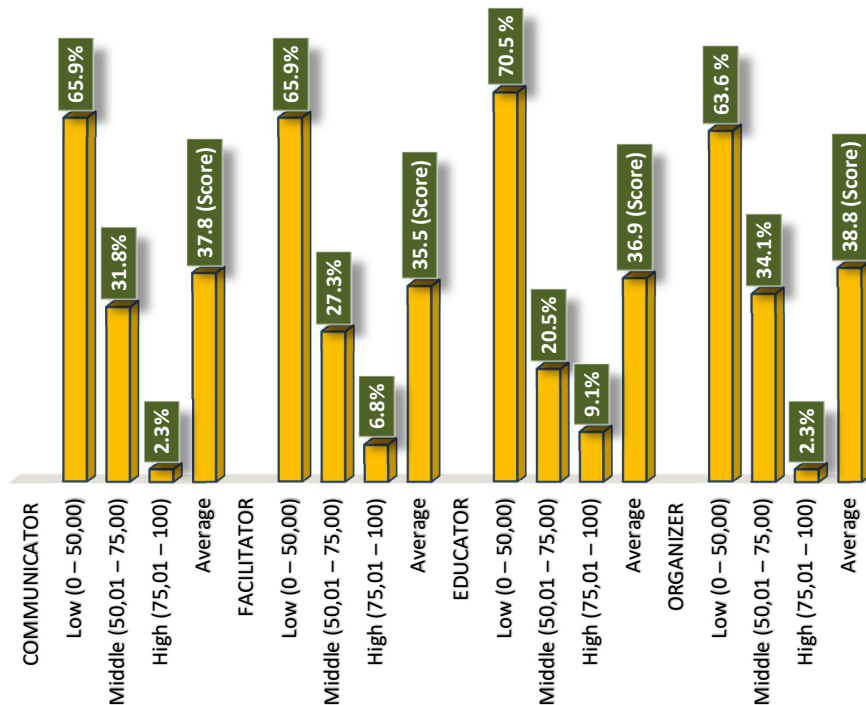


Figure 2. Distribution, Number and Average Role of Extension Workers

The role of extension as communicators is relatively low 65.9% with an average of 37.8. Both in conveying rice cultivation, information on rice prices, information that becomes farmers' needs, overcoming pest diseases, and various media needs for farmers figure 2. Based on observations in the field, extension workers have not been much involved in counseling planning, their goals of working as extension agents are not limited to carrying out civil servant tasks but their desire to share.

The role of extension workers as facilitators is relatively low, both in assisting farmers to obtain capital resources, easy access to new agricultural tools, deciding on the right time to plant rice, accessing credit, selling products, using pesticides and ease of obtaining fertilizer 65.9% with an average of 35.5. The importance of the role of instructors as facilitators must be accompanied by good capacities, good capacities can be increased through formal education or inclusion of extension workers in training activities [9].

The role of extension workers as educators is low, both in carrying out training in compost making, good ways of cultivating rice, using superior varieties, making vegetable pesticides, information on how to deal with rice pests, using water and using appropriate fertilizers 70.5% with averaging 36.9 (Figure 2). Based on interviews with farmers, what is needed by farmers is easy to access to fertilizer and how to deal with rice pests and diseases. That instructors are not able to provide the information needed by farmers, due to limited insight and lack of instructor access to information sources.

The role of extension workers as organizers is relatively low, in encouraging cooperation with other farmers, encouraging joining farmer groups, helping farmer groups to become a developing group, encouraging the formation of groups according to farmers' needs, and helping develop groups 63.6% with an average of 38.8 (Figure 2). Each farmer has a group and each farmer group consists of 10–20 farmers and has a clear group structure. But according to farmers, farmer groups have not performed their roles well. Not yet a place to learn and share farming information, but only acts as a liaison between the agriculture department and farmers. The inactivity of farmer groups in Tayawa Village is due to the low participation of members or farmers to participate in activities in farmer groups, because farmers have their respective activities, such as taking care of the land and doing side jobs.

### **3.3. Rice Farmers' Competencies**

Competence is knowledge, skills, and abilities possessed by farmers and become part of him so that he can run his farm both cognitively, affectionally, and psychomotor behavior. Means competence can cause or be used to see the performance of farmers, have high competence, it will have high performance and agribusiness that is sought to be successful. The level of competence of farmers is seen from the aspects of cultivation, harvesting, postharvest, and marketing (Figure 3).

Farmers' competency in terms of cultivation is middle, being prepared in the field, land management, weeds, the use of inorganic and organic fertilizers, how to deal with pest attacks, and the ability of farmers to provide organic fertilizer 70.5% with an average of 56.4 (Figure 3). This means that the actions of farmers in carrying out their farming business are still moderate. To increase sustainable rice productivity, ultimately new technologies and supporting innovations are needed. In this case, the Agency for Agricultural Research and Development continues to research cultivation technology innovations including the release of new high yielding varieties of high yielding rice so that in its development it takes the participation of user farmers to work on these varieties. By evaluating the Integrated Crop Management pattern in its implementation, the component of quality New Varieties of New Rice becomes the main package. Likewise in the seed-assisted program for farmers, namely the Assistance of Superior Seeds or and the National Seed Reserve, very helpful and support the increase in national rice production. States that

cultivation knowledge and skills are important in developing competent individuals. The development can be enhanced through learning strategies both through problem-based education (non-formal education) and case studies.

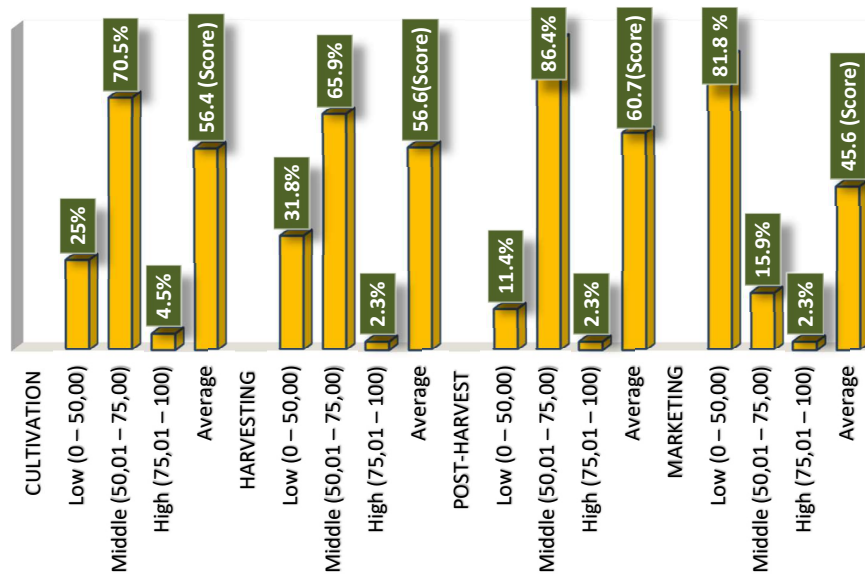


Figure 3. Distribution, Number and the Average Level of Competence of Rice Farmers

Farmers' competency in terms of harvesting is middle, in the ability of farmers to determine criteria for ready-to-harvest rice, use of harvesting tools, utilization of combined harvester, preparing harvesting tools, and use of harvesting tools that suits farmers' needs 65.9% with an average of 56.6 (Figure 3). Field observations show that farmers use urea, NPK, ZA, and Liquid Organic Fertilizer. Even though farmers have used fertilizers and used superior seeds such as Ciliwung, Buri-Buri, Santana, Ciherang, Cigeulis, Inpago 8, Sertani 13, and Intani varieties, but farmers are still having problems with the availability of fertilizer. In general, subsidized fertilizer when needed is not available, this causes some farmers to not fertilize. Average harvesting is still done manually, only a few use a combine harvester. The rental system uses the method of six sacks of grain released one. According to H.B, a farmer from Tayawa Village, the presence of the harvesting machine can help the harvest process. Besides being fast, the grain produced is not much wasted.

Farmers' competency in the postharvest aspects is middle, in terms of grain collection, sack use, drying process, grain moisture content, grain storage, grinding process, and watching the grinding process to completion 86.4% with an average of 60.7 (Figure 3). Observation results indicate, farmers work together with the owner of the mill, for the needs of transporting grain from the land to the mill, the place of milling and grinding services with a ten-kilogram system out one. Of course, the higher the wage of the miller, the income of farmers will decrease. Wages issued by farmers vary according to how much rice has been produced by farmers at the time of milling.



Farmers' competency in terms of marketing is low, in terms of rice sales, government control of rice prices, market information, cooperation with collecting traders, village-owned enterprises, and cooperatives 81.8% with an average of 45.6 (Figure 3). Problems in the field are generally farmers are forced to daily needs, borrowing money from the owner of the mill, and the consequences of the harvest are mostly owned by the mill owner. This has an impact on the low income of farmers. The low ability of farmers to access markets is also due to the low level of cosmopolitanism figure 1. In the sales process, farmers generally bargain to get a better price. The results showed that the average price per sack received by farmers was IDR 410,000/sack. Also, the results are directly sold to parliament. Besides being not difficult to find, the price offered is sometimes good and not disappointing, it also makes the lack of marketing institutions and government control weak.

### **3.4. Farmers' Income**

Farming sustainability is characterized by an increase in farmer's income. The income of farmers obtained by farmers in farming for one season is calculated based on the sale of rice minus expenses or costs during the production process. Based on the income of rice farmers is classified as moderate. These results indicate that rice sales, the family economy, and family needs are adequately met.

Based on the results of research and interviews with farmers obtained information that farmers have difficulty in marketing the results due to lack of buyers. The low income of farmers is influenced by low production and the amount of farmers' expenditure, an average expenditure of IDR 3.745.114 per planting season/hectare both for the purchase of fertilizers, herbicides, pesticides, labor, equipment depreciation costs, and transportation costs. Average acceptance of IDR 11.671.023 per planting season/hectare and farmer's income in each planting season is IDR 7.925.909. Revenue is the difference between sales revenue and production costs. Gross income (output) and production costs (input) calculated per hectare. The income of rice farmers in Tayawa Village is based on an average of IDR 1.981.477/month. This shows that the income of rice farmers is still below the minimum wage in Central Sulawesi Province in 2019 amounting to IDR 2,418,409/month. These results do not affect the sustainability of farming because based on the calculation of the R/C ratio of 3.11 or  $> 1$  so it can be concluded that rice farming is still feasible to be cultivated.

### **3.5. Determinants of Farmer Competency Level**

Based on the results of multiple regression analysis the factors that have a very significant influence on the level of competence of farmers are the role of agricultural extension workers ( $X_2$ ). The test is done comparing the values of t-counts and t-tables for each variable. If the variable value is greater than the t-table (1.68) at a significant level of 0.05, then the hypothesis

is accepted. The hypothesis appears to be unproven and only accepted for the role of agricultural extension workers ( $X_2$ )

**Table 1.** Regression Coefficient Values of Farmer Characteristics and the Role of Agricultural Extension Workers to Improve the Competence of Rice Farmers

Indicator	Rice Farmers' Competencies		
	Regression Coefficient	t	Sig.
Constant	1.684	0.165	0.870
Farmer's Age ( $X_{11}$ )	0.013	0.074	0.942
Formal Education ( $X_{12}$ )	0.069	0.185	0.854
Non-formal Education ( $X_{13}$ )	0.072	1.010	0.319
Rate of Cosmopolitan ( $X_{14}$ )	-0.030	-0.058	0.954
Land Area Under Cultivation ( $X_{15}$ )	0.252	0.114	0.910
Farmer's Experience ( $X_{16}$ )	-0.089	-0.524	0.603
The Role of Extension ( $X_2$ )	<b>1.145</b>	16.121	0.000**
$R^2$			0.898
$F_{value}$			45.261
Sig			0.000

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

Mathematically the regression equation of the factors that influence the level of competence of rice farmers is

$$Y_1 = 1.684 + 1.145 X_2 \qquad R^2 = 0.898$$

The results of the regression analysis showed that  $R^2 = 0.898$ ; this indicates that 89.8% of farmer competencies ( $Y_1$ ) can be explained by one latent variable, namely the role of agricultural extension workers ( $X_2$ ). The competence of rice farmers tends to be due to the low role of extension workers. The test results show that the factors that have a more dominant influence on the level of competence of farmers are the role of extension workers and the characteristics of farmers do not show the effect. The extension is the involvement of a person to carry out targeted communication of information to help each other provide opinions so that they can make the right decision [10]. Thus to improve the competence of rice farmers it is necessary to improve non-formal education of farmers by providing many learning opportunities such as attending exercises, seminars, technology meetings, counseling related to problems faced by farmers. One extensionist suggested that rice farmers now interact with extension agents who are often asked by government policies to address the scarcity of fertilizers and innovation assistance. Most farmers are very dependent on farming activities generated as a source of income to meet the needs of families, therefore farmers must have adequate knowledge, attitudes, and skills about the use of appropriate information and innovation.

According to S.R and Z.L, rice farmers from Tayawa, the local government of the Tojo Una District Agriculture Service cannot provide superior seeds and encourage the availability of rice buyers at prices that are in line with farmers' expectations, providing a rice shelter that benefits farmers. What is meant by farmers must be critical of outside innovations and what can be done

as a basis to support future discussion strategies. The approve the learning process which is facilitated and equipped with new knowledge and technology.

Farmers as farm managers are inseparable from problems. To be able to overcome farming problems correctly and appropriately, adequate farmer competence is needed covering aspects of knowledge, attitudes, and skills. The average competence of rice farmers in overcoming the problems of farming both cultivation, harvesting, postharvest tends to be moderate but different from the marketing process is relatively low. These results are by the research that the low competency is due to the weak role of extension workers. Farmers need extension agents in providing information, developing business partnerships, capital, markets, providing solutions to farming, encouraging and increasing the effectiveness of farmer groups. Based on this, extension agents and farmers should process together, share information and experience, work together, and help each other so that eventually farmers can make the right decisions for business development.

#### 4. Conclusion and Recommendation

The level of competence of middle rice farmers tends to be low, due to the weak role of agricultural extension workers. The role of the instructor as a communicator, facilitator, educator, and communicator turned out to have a positive effect on increasing the competence of rice farmers. But now these factors tend to be low so that it is still lacking in efforts to increase the competence of rice farmers. The role of extension workers is needed by farmers and without extension, there is no benefit of modern agricultural techniques and modern information. Agricultural extension workers become a means that connects farmers with information sources and looks for solutions to increase farmers' competency and income. Therefore increasing the role of extension workers is needed by farmers.

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