

The Role of Extension Workers in Pepper Farming (*Piper Nigrum*) in Batu Timbau Village, Batu Ampar Sub-District, East Kutai District

Muhamad Yazid Bustomi*

Pengelolaan Perkebunan, Politeknik
Pertanian Negeri Samarinda
Samarinda, 75131
bustomy.Myazid@gmail.com

*Corresponding author

Nursida

Agroteknologi, Sekolah Tinggi
Pertanian Kutai Timur
nursida@stiperkutim.ac.id

Riski Adi Pratama


Agroteknologi, Sekolah Tinggi
Pertanian Kutai Timur
adipratamarisky978@gmail.com

Pandhu Rochman Suosa Putra

Pengelolaan Perkebunan, Politeknik
Pertanian Negeri Samarinda
Samarinda, 75131
pandhurochmansuosa@gmail.com

Andi Lelanovita Sardianti

Pengelolaan Perkebunan, Politeknik
Pertanian Negeri Samarinda
Samarinda, 75131
andi.lelanovita@yahoo.com

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Abstract—The development of pepper farming in Batu Timbau Village cannot be separated from the role of agricultural extension workers in encouraging and providing information to farmers. This study aimed to determine the role of extension workers in pepper farming in Batu Timbau Village, Batu Ampar Sub-District, which is seen from the aspects of motivators, educators, catalysts, organizers, and communicators. This research was carried out in 2021 in Batu Timbau Village, Batu Ampar Sub-District, East Kutai District. The sampling technique in this study used the census method with a total sample of 47 pepper farmers. The data analysis method used was descriptive statistics with a 3-item Likert scale. The results showed that the role of extension workers for pepper farmers in Batu Timbau Village was included in the role category seen from five aspects of the assessment. The role of extension workers for pepper farmers in the motivator aspect was included in the interval between 391.71 - 548.30 which is included in the role category with a value of 488. In the educational aspect, it is included in the interval of the role category with a value of 472. In addition, the aspect of organizers, communicators, and catalysts are in the interval of role categories with values of 485, 502, and 545 respectively.

Keywords—Extension, Likert Scale, Pepper Farming, Role

I. INTRODUCTION

Agricultural extension is an effort to change the behavior of farmers so that they know and have the will and ability to solve problems in business or activities to improve their business results (Marbun et al. 2019). Agricultural extension workers have a strategic role in helping to increase agricultural production (Khairunnisa

et al. 2021). In addition, agricultural extension is an important learning tool for farmers and their families in achieving development and increasing agricultural production (Aulia, et al. 2022).

The role of agricultural extension workers can be measured through the level of farmer satisfaction in obtaining services from their extension workers (Effendi et al. 2021). Good extension worker performance is very important to maximize extension activities (Widiana et al. 2020).

Agricultural extension workers play an important role in realizing national development (Guntoro et al. 2014). The role of agricultural extension workers has a strategic position, namely as an organizer of out-of-school education for members of farmer families, members, and other communities. Kusumawati et al. (2021) state that the extension worker can be interpreted as the ability of extension workers to provide services to farmers in every farming activity. According to Wulandari et al. (2021), agricultural extension is tasked with providing encouragement to farmers to want to change their way of thinking, working, and living which is more in line with the times, and the development of agricultural technology.

Extension services as a professional activity of development education services with the intention, extension workers place humans as independent and empowered development subjects in adapting fairly and civilly to changes in their environment (Listiana et al. 2018). Agricultural extension is one of the sources of information for farmers in increasing farmer productivity (Amrullah et al. 2019). Extension activities require information sources based on information and communication technology (ICT) (Gultom and Gitosaputro, 2020). Agricultural extension workers connecting agricultural institutions to farmers are required to have adequate information about agricultural

practices before they convey, educate, and train farmers (Wulandari, 2015). While Altalb et al. (2015) mentioned that agricultural extension workers function to transfer innovations and new technologies in agriculture to farmers and transfer the results of agricultural technology utilization.

The role of extension workers in assisting farmers is very necessary in order to increase agricultural production (Inten et al., 2017). Agricultural extension workers are expected to be able to increase the participation of farmers to cooperate and participate in supporting the course of work programs so that the expected goals can be achieved (Yuniarti, et al. 2017). They always make farmers understand the capabilities of farmers, and extension workers must be able to influence their targets. So that a good relationship between agricultural extension workers and members can be established to increase members' ability in agricultural development (Mujiburrahmad et al., 2014).

Batu Timbau Village is one of the villages in Batu Ampar Sub-District with an area of 488.04 km² with most of the population making a living as farmers. Most of what is cultivated by most farmers are pepper plants since this crop has bright prospects for farmers. According to Nursalam (2020), pepper is one of the plantation export commodities that has an important meaning in the country's foreign exchange receipts and has great potential for Indonesia's economic growth.

The area of agricultural land in the development of pepper farming in Batu Timbau Village is 68 Ha. Meanwhile, for Batu Ampar Sub-District, the area of land used for pepper crop commodities of 274.5 ha contributes the largest pepper production for the East Kutai District area, producing 102.59 tons/year (BPS Kutai Timur, 2020).

Increasing the yield of pepper crop production in Batu Timbau Village can be done by optimizing the use of production factors (internal factors) such as land area, planting distance, labor, seeds, and fertilizers effectively and efficiently. These production factors have a role as means of production and increase and success of pepper crop production if capacity is used proportionally. The success of increasing the annual production of pepper will be able to increase the role of extension workers which ultimately has an impact on improving the welfare of farmers.

In addition, the success of pepper farming can also be influenced by external factors such as the existence of an agricultural extension that always provides information and education to farmers on how to increase their agricultural production. One important aspect of agricultural extension is the application of appropriate agricultural extension methods. The application of appropriate and targeted extension methods can provide positive developments in improving agricultural business.

Evaluation of the activities by agricultural extension workers needs to be carried out, this aims to make the activities carried out so far have a significant impact on the productivity of pepper farming in Batu

Timbau Village. What things are needed and expected by farmers for existing extension workers. The evaluation of the performance of extension workers in this study is more to find out the role or contribution made that has been felt by farmers. Through this research, it is expected to help various parties related to the evaluation of activities carried out by extension workers.

Based on the problem, this study aims to determine the role of agricultural extension workers in pepper farming in Batu Timbau Village, Batu Ampar Sub-District. Through this research, it will be known the role of pepper farming agricultural extension workers in Batu Timbau Village, Batu Ampar Sub-District. In addition, it is also as performance evaluation of extension workers who have been running in Batu Timbau Village, especially for pepper farming.

II. METHODOLOGY

This research was carried out in 2021 and took place in Batu Timbau Village, Batu Ampar Sub-district, East Kutai District. The selection of research sites was carried out *purposively* with the consideration that in Batu Timbau Village the majority work as pepper farmers, Batu Timbau Village is the center of most pepper farmers in Batu Ampar Sub-district.

The method of data collection carried out in this study is field observation, which is in making observations or reviewing directly to the research location to get a clear picture of the activities of pepper farmers. The types of data conducted in this study are primary and secondary data. The supporting data sources used in this study consisted of primary and secondary data. Primary data were obtained from interviews with respondents using questionnaires, namely farmers. Respondents in this study focused on pepper farmers. Secondary data are data obtained from supporting literature studies such as journals, and previous research results.

The population in this study is all pepper farmers located in Batu Timbau Village, Batu Ampar Sub-District. Based on data from UPT. PPPP Batu Ampar Sub-District located in Batu Timbau Village in 2020 is known to have 47 pepper farmers. The sampling technique used is *saturated sampling* (census). A census is a structured way of obtaining informational descriptions of the numbers of a population.

The data analysis used in this study is a descriptive statistical analysis, which is descriptive of the role of extension workers in pepper farming based on 3 categories, simply play a role, role, and instrumental. The role category of extension workers is measured using 5 aspects, namely motivators, educators, catalysts, organizers, and communicators, with the help of a 3-point Likert scale. The scale is given a score of 1 to 3, where the score is 1 (simply play a role), a score of 2 (role), and a score of 3 (instrumental).

According to Budiaji (2013) that the likert scale is used to measure attitudes, income, and perceptions of a person or group about social events or symptoms, then by using the Likert scale the variables used are translated

into indicators that can be measured. The extension role category is seen based on class intervals calculated using calculations with the class interval formula Sugiyono (2009) in the following formula (1).

$$C = \frac{Xn - Xi}{K} \tag{1}$$

Where (1):

C= Class interval

K= Number of classes

Xn= Number of highest values

Xi= Number of lowest values

$$\text{Class interval} = \frac{\sum \text{highest value} - \sum \text{lowest value}}{\text{Number of classes}}$$

$$\begin{aligned} \text{Highest values} &= \text{highest score} \times \sum \text{questions} \times \sum \text{respondent} \\ &= 3 \times 5 \times 47 \\ &= 705 \end{aligned}$$

$$\begin{aligned} \text{Lowest values} &= \text{lowest score} \times \sum \text{questions} \times \sum \text{respondents} \\ &= 1 \times 5 \times 47 \\ &= 235 \end{aligned}$$

$$\begin{aligned} \text{Class interval} &= \frac{705-235}{3} \\ &= 156.67 \end{aligned}$$

The interval value is used as the distance between categories for extension roles. In this study, the highest score on the Likert scale was 3, while the lowest score was 1. While the number of questions in each aspect of the extension role is 5 and the total number of respondents is 47, so the highest value is 705 as stated in formula 1. The lowest value is obtained from the lowest score on the Likert scale used, which is 1, and each aspect consists of 5 questions and the total number of respondents is 47 so the lowest score is 235. To get the class interval, subtract the highest value from the lowest value and divide it by 3 so that the class range is 157.67. In Table 1 the following contains class intervals and extension role categories from lowest value to highest value.

Table 1. Intervals and Categories Extension role

No	Class Interval	Category
1	235 - 391,70	Simply Play a Role
2	391,71 - 548,30	Role
3	548,31 - 705	Instrumental

The role of extension workers is seen based on 5 aspects, namely aspects of motivators, educators, catalysts, organizers, and communicators. Each aspect used consists of 5 instruments that are associated with improving the function of farmer groups, cultivation, application of technology, market access, and education and training. Based on the assessment of instruments on these aspects, the role of extension workers will be known

as motivators, educators, catalysts, organizers, and communicators.

To find out the role of extension workers in categories 1, 2, or 3, namely through the value of summing the scores of each respondent's answer instrument in each aspect. In Table 2 the following contains instruments in each aspect used in this study. Table 2 contains instruments in each aspect used in this study.

Table 2. Assessment Instrument on Aspects of the Role of Extension Workers in Pepper Farmin

Aspects	Instruments
Motivators	Conducting socialization activities in improving the function of farmer groups. Motivates the importance of using technology in farming.
	Assisting farmers in providing encouragement to farmers to be able to change farmers' understanding in using technology. dissemination of information in marketing access. Assist farmers in improving the cultivation of pepper crops.
Educators	increase the capacity of pepper farmers to new ideas to develop farming. Provide farming training or how to use good technology to farmers. Provide support for every agricultural activity in increasing agricultural capacity. provide the latest ideas on plant care and pest control. provide training on harvesting and post-harvest.
	convey policies in accelerating the process of accepting innovations and regulations in agriculture. Bringing new innovations that can advance farming. Provide advice and solutions in the problems faced by farmers. help farmers to obtain capital, both knowledge and funds for development in pepper farming. Helping farmers collaborate with financial institutions and non-governmental organizations.
Catalyst	Provide direction in increasing the capacity of farmers so that they can function as teaching and learning classes. encourage in choosing a business so that farmers can manage and develop farmer groups. Encouraging farmers to continue to advance farmer groups encourage farmers to increase production yields. conveying the importance of joining farmer groups.
	Help speed up the flow of information to farmer groups. Assisting farmers in the decision-making process. Assist communication within farmer
Organizers	
Communicators	

groups so that messages are received accurately.
 able to communicate well to farmers.
 convey information that is easily understood by farmers.

III. RESULTS AND DISCUSSION

The characteristics of respondents are seen from the condition or characteristics of farmers who run pepper farming in Batu Timbau Village, Batu Ampar Sub-District, East Kutai District. The characteristics of respondents consist of gender, age, and level of education. The description of the characteristics of respondents explains the distribution or percentage used in this study. In Table 3. Characteristics of respondents based on gender, age, and education.

Table 3. Characteristics of respondents

Criterion	Information	Number (of people)	Percentage (%)
Gender	Man	30	63,80
	Woman	17	36,20
Age	40-49	17	36,17
	50-59	20	42,55
	60-69	10	21,27
Education	No School	10	21,27
	SD	15	31,91
	SMP	12	25,53
	SMA	10	21,27

Based on gender, the number of male respondents was 30 people or 63.80% and the number of female respondents was 17 people or 36.20%. Generally, men have greater workability than women, because women tend to be less optimal in farming pepper plants.

Based on age, respondents who were in the age range of 40-49 years were 17 people or 36.17%, the age range between 50-59 years was 20 people or 42.55% and the age range between 60-69 years was 10 people or 21.27%. Age will greatly affect farming activities. This is related to the ability to work, and the way farmers think in accepting new innovations. In general, young farmers have stronger physical abilities and are more responsive to the application of new innovations than older farmers. Pepper farmers in Batu Timbau Village who work as farmers are still encouraged to be productive, the productive age is between 15-64 years. This is in accordance with the opinion.

Based on the level of education, it is known at the elementary school level (SD) with a total of 15 people

(31.91%). The highest education pursued by respondent farmers was Junior High School (SMP) education with a total of 12 people (25.53%). The highest education taken by respondent farmers was Senior High School (SMA) education with a total of 10 people (21.27%) and as for respondent farmers who did not take education / did not go to school 10 people (21.27%).

Education opens farmers' insights into receiving information and technology in agriculture considering the rapid development of technology which is expected to have a good impact on increasing production, and income and ultimately will improve the welfare of farmers' living standards. The identity of respondent farmers in terms of the level of education of farmers in Batu Timbau Village. The level of education of farmers can affect the mindset of farmers in the application of new ideas obtained. Educated farmers are generally more receptive to innovation than uneducated farmers, although this is not absolute for every farmer.

A. *The Role of Extension Workers in Pepper Farming in Batu Timbau Village, Batu Ampar Sub-District.*

The role of agricultural extension workers in the performance of farmer groups is a task that is expected to be carried out by agricultural extension workers in exploring new ideas by utilizing existing facilities to seize opportunities so that they can help farmers by increasing their income in farming. A good relationship between extension workers and farmers is very important so that extension workers gain credibility in the eyes of farmers so that the recommendations conveyed by extension workers are easier for farmers to obey or trust.

The role of extension workers in pepper farming is based on the knowledge, skills, and abilities of each farmer, agricultural extension workers are required to make plans on several things that can help farmers express opinions and make effective decisions and can increase farmer productivity. Meanwhile, the forms of the role of extension workers studied are the role of extension workers as motivators, educators, catalysts, organizers, and communicators.

B. *The Role of extension workers as Motivators*

In this study, the role of agricultural extension workers in empowering pepper farmers is associated with improving the function of farmer groups, cultivation, application of technology, market access, and education and training so that writing instruments is associated with these things. In Table 4. shows value the role of extension workers as motivators.

Table 4. The Role of Extension Workers as Motivators

Category	Scale Value	1 st Instrument		2 nd Instrument		3 rd Instrument		4 th Instrument		5 th Instrument	
		∑	Score	∑	Score	∑	Score	∑	Score	∑	Score
Simply Play a Role	1	15	15	10	10	11	11	9	9	9	9
Role	2	17	34	20	40	20	40	26	52	26	52
Instrumental	3	15	45	17	51	16	48	12	36	12	36
Total		47	94	47	101	47	99	47	97	47	97
Average			2,00		2,15		2,11		2,06		2,06
Grand Total											488
Interval Categories											Role

Extension workers carry out socialization activities in improving the function of farmer groups with a value of 94, for example, extension workers provide direction or advice to farmers on how to use fertilizers and pesticides appropriately according to dosage. Extension workers motivate the importance of using technology in trying to farm pepper with a value of 101, for example, extension workers help farmers use new technology to make it easier for farmers to care for pepper plants and get better results. The technology referred to in this study includes extension workers assisting farmers in providing encouragement to farmers to be able to change farmers' understanding of using technology with a value of 99, for example teaching how to use technology and assistance involving extension workers and farmers.

The role of extension workers is to disseminate information in marketing access with a value of 97, for example, extension workers provide information on how to market to pepper farmers through social media and promote pepper crops to village markets. Extension workers assist farmers in increasing the cultivation of pepper plants with a value of 97, for example, to make superior products in the agricultural and plantation sectors, one of which is the policy implemented in the

pepper marketing strategy. It is said that the community only has 1 extension worker per village.

Based on the interval in Table 4, the motivator class interval gets an overall value of 488. The value is between the values of 391.66-548.32, this means that the role of extension workers as motivators in empowering pepper farmers is said to play a role.

C. *The Role of extension workers as Educators*

The role of extension workers as educators are analyzed using 5 statements where farmers' assessment of statements can be seen in Table 4. Based on Table 4, the role of extension workers as educators get an overall score of 472. Based on the value of the class interval used, the value of 472 is between the class interval values of 391.66 - 548.32, it can be interpreted that the educational aspect is good. So far, the extension team has been able to increase the capacity of pepper farmers to new ideas to develop farming businesses with a value of 93, for example by handling pests and weed control. Extension workers can provide training in farming or how to use good technology to farmers with a value of 99, for example, training on how to make natural fertilizers and reduce chemicals. In Table 5. shows value in the role of extension workers as educators.

Table 5. The Role of Extension Workers as Educators

Category	Scale Value	1 st Instrument		2 nd Instrument		3 rd Instrument		4 th Instrument		5 th Instrument	
		∑	Score	∑	Score	∑	Score	∑	Score	∑	Score
Simply Play a Role	1	13	13	10	10	10	10	11	11	14	14
Role	2	22	44	22	44	26	52	22	44	25	50
Instrumental	3	12	36	15	45	11	33	14	42	8	24
Total		47	93	47	99	47	95	47	97	47	88
Average			1,98		2,11		2,02		2,06		1,87
Grand Total											472
Interval Categories											Role

Extension workers provide support for every agricultural activity in increasing the capacity of farmers with a value of 95, for example providing agricultural facilities to farmers such as fertilizers, agricultural technology, and seeds, extension workers provide the latest ideas/ideas/breakthroughs about plant care and pest control with a value of 97, for example, ways to make vegetable pesticides from natural ingredients.

Extension workers provide training on harvesting and post-harvest with a score of 88, for example, soaking

harvesting, skin separation and washing, drying, and packaging. So, it can be concluded that extension workers can serve farmers well. With the statement, extension workers can provide farming training or how to use good technology to farmers can carry out their respective tasks or functions with a value of 99.

D. *The Role of extension workers as Catalysts*

The role of extension workers as catalysts is 5 statements with 5 different scores, as shown in Table 6.

Table 6. The Role of Extension Workers as Catalysts

Category	Scale Value	1 st Instrument		2 nd Instrument		3 rd Instrument		4 th Instrument		5 th Instrument	
		∑	Score	∑	Score	∑	Score	∑	Score	∑	Score
Simply Play a Role	1	12	12	10	10	10	10	7	7	13	13
Role	2	23	46	20	40	19	38	20	40	17	34
Instrumental	3	12	36	17	51	18	54	20	60	17	51
Total		47	92	47	101	47	102	47	107	47	98
Average			2,00		2,15		2,17		2,28		2,09
Grand Total											502
Interval Categories											Role

Based on Table 6, it is known that the role of extension workers as catalysts gets an overall value of 502. Based on the value of the class interval used, the value of 502 is between the class interval values of 548.32 - 704.98, it can be interpreted that the catalyst aspect is very good. So extension workers help farmers to get capital, both knowledge and funds for development in pepper farming with a value of 107, so it can be concluded that extension workers and farmers have begun to work well together. Extension workers convey policies in accelerating the process of receiving initiatives and regulations in agriculture with a category with a value of 94, for example providing agricultural research or assessment in carrying out communication activities that are important in encouraging the process of technology dissemination in a rural social system. Extension workers bring new innovations that can advance farming with a value of 101, for example, extension workers provide a way of planting shrub pepper that does not spread and does not require climbing poles. The extension team provides suggestions and solutions to problems faced by farmers with a value of 102, for example, extension workers provide efforts made with the development of plantation crop seeds ranging from source seeds to spread seeds. Extension workers help farmers to get capital with a value of 107, for example, extension workers help farmers by submitting proposals for funding applications.

Extension workers help farmers cooperate with financial institutions, for example, extension workers direct farmers to cooperate with banks and agricultural cooperatives.

E. The Role of extension workers as Organizers

The role of extension workers as organizers is 5 statements with 5 different scores, as shown in Table 7. Based on Table 7, the interval of the organizer class gets an overall value of 482. Based on the value of the class interval used, the value of 482 is between the class interval values of 391.66 - 548.32, it can be interpreted that the interval of the organizer class is good. With extension workers encouraging farmers to continue to advance farmer groups with a value of 100, extension workers provide direction in increasing farmer empowerment so that they can function as teaching and learning classes with a value of 99, for example, extension workers conduct routine socialization, open discussion, and assessment rooms so that they are easily accepted by farmers.

Extension workers encourage in choosing a business so that farmers can manage and develop farmer groups with a value of 93, for example, pepper businesses managed by farmers are recommendations from extension workers.

Table 7. The Role of Extension Workers as Organizers

Category	Scale Value	1 st Instrument		2 nd Instrument		3 rd Instrument		4 th Instrument		5 th Instrument	
		∑	Score	∑	Score	∑	Score	∑	Score	∑	Score
Simply Play a Role	1	10	10	12	12	10	10	10	10	12	12
Role	2	22	44	24	48	20	40	26	52	19	38
Instrumental	3	15	45	11	33	17	51	11	33	16	48
Total		47	99	47	93	47	101	47	95	47	98
Average			2,11		1,98		2,15		2,02		2,09
Grand Total											486
Interval Categories											Role

This means that suggestions in managing have previously been surveyed or reviewed by extension workers to see the ease of management, easy or available market access, and adjust to the ability, understanding, or performance of farmers, through these efforts, farmers develop individual or group skills. Extension workers encourage farmers to continue to advance farmer groups with a value of 100, for example trying to develop the principle of deliberation for consensus in every group policy and decision-making. Extension workers can encourage farmers to increase production yields with a value of 95, for example through agricultural

diversification programs, agricultural diversification is an effort to increase production, the aim is to avoid dependence on only one type of agricultural crop. Extension workers conveyed the importance of joining a farmer group with a value of 95, for example by joining a farmer group many benefits were obtained, strengthening friendships, learning from each other, helping each other, learning to listen to other people's opinions, and learning to convey suggestions, opinions or thoughts. With the conclusion that all farmers and extension workers can collaborate in agriculture.

F. *The Role of extension workers as Communicators*

The role of extension workers as communicators is 5 statements with 5 different scores, as shown in table 8. Based on Table 8, the communicator class interval gets an overall value of 545. Based on the value of the class interval used the value 545 is between the value of the class interval 548.32-704.98, it can be interpreted that the communicator class interval is very good. Penyuluh helps accelerate the flow of information to farmer groups with a value of 107 good categories, for example, extension workers carry out effective communication that can bring out the common meaning of messages or information between senders and recipients.

Extension workers assist farmers in the decision-making process with a value of 97, for example, agricultural extension workers involve communication between people in conveying information to decide. Extension workers help communication in farmer groups so that messages are received accurately with a value of 106, for example, communication, where field agricultural extension workers are the source of information and farmers, are the recipients of information.

Table 8. The Role of Extension Workers as Communicators

Category	Scale Value	1 st Instrument		2 nd Instrument		3 rd Instrument		4 th Instrument		5 th Instrument	
		Σ	Score	Σ	Score	Σ	Score	Σ	Score	Σ	Score
Simply Play a Role	1	5	5	11	11	5	5	3	3	0	4
Role	2	24	48	22	44	25	50	21	42	20	40
Instrumental	3	18	54	14	42	17	51	23	63	27	81
Total		47	107	47	97	47	106	47	114	47	121
Average			2,28		2,06		2,26		2,43		2,57
Grand Total											545
Interval Categories											Role

Extension workers can communicate with farmers with a value of 114, for example, farmers can be fostered and guided by good communication and still provide strong encouragement and confidence to farmers. Extension workers convey information that is easily understood by farmers with a value of 121, for example, the target of agricultural extension workers, namely group leaders and farmer group members, communication effects received from the delivery of agricultural extension information which includes cognitive effects, affective effects, and conative effects. With the conclusion that all farmers and extension workers can collaborate in agriculture well.

IV. CONCLUSION

Each aspect that measures the role of agricultural extension workers in pepper farming is included in the role category. The role of extension workers in pepper farming is needed by farmers, for example in improving the function of farmer groups, applying appropriate technology in the cultivation process, accessing markets for pepper harvests, and training activities for farmers in supporting pepper farming activities in Batu Timbau Village. The role of extension workers in the motivator aspect with a value of 488 is classified as a role category. In the aspect of educators with a value of 472 who are in the category of playing a role. In addition, the role of extension workers as organizers with a value of 485 is also in the class interval with the category playing a role. Meanwhile, the role of agricultural extension workers in pepper farming as catalysts and communicators with values of 502 and 545 respectively is also in the category of a role.

This research is still limited to measuring the role of extension workers just with a Likert scale. For further

research, it can identify what factors affect the role of extension workers, so that it can be used as a strategy in increasing the role of extension workers in pepper farming to obtain maximum results.

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