

The Effectiveness of the Role of Agricultural Extension Workers to Increase Rice Paddy Productivity in Asahan Regency

Efektivitas Peran Penyuluh Pertanian Guna Meningkatkan Produktivitas Padi Sawah di Kabupaten Asahan

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(Diterima 10-10-2023; Disetujui 18-11-2023)

ABSTRACT

Asahan Regency occupies the 13th position out of 33 regencies/cities as a rice producer in North Sumatra Province the rice productivity results are relatively low so that it is a problem that needs to be resolved. Agricultural extension workers act as motivators, educators, facilitators and communicators. This study aims to determine and analyze the influence of the role of agricultural extension agents on the productivity of paddy rice in Asahan Regency. The study was conducted in Asahan Regency, North Sumatra Province using primary data obtained from direct surveys and secondary data as supporting data using the Stratified Proportional Random Sampling method. The respondents were farmers from 3 sub-districts, namely Rawang Panca Arga, Sei Kepayang and Meranti districts. Data analysis using description analysis and Partial Least Square (PLS).

Keyword: agriculture, fasilitator, motivator, rice, PLS

ABSTRAK

Kabupaten Asahan menempati posisi ke-13 dari 33 kabupaten/kota sebagai produsen padi di Provinsi Sumatera Utara Hasil produktivitas padi tergolong rendah sehingga menjadi permasalahan yang perlu untuk diselesaikan. Penyuluh pertanian berperan sebagai motivator, edukator, fasilitator dan komunikator. Penelitian ini bertujuan mengetahui dan menganalisis pengaruh peran penyuluh pertanian terhadap produktivitas padi sawah di Kabupaten Asahan. Penelitian dilakukan di Kabupaten Asahan Provinsi Sumatera Utara menggunakan data primer yang didapatkan dari survei langsung serta data sekunder sebagai data pendukung dengan metode Stratified Proportional Random Sampling. Responden adalah petani yang berasal dari 3 kecamatan yaitu Kecamatan Rawang Panca Arga, Sei Kepayang dan kecamatan Meranti. Analisis data menggunakan analisis deskripsi dan Partial Least Square (PLS).

Kata kunci: pertanian, fasilitator, motivator, padi, PLS

INTRODUCTION

North Sumatra Province occupies the 6th position as a rice producer in Indonesia with a share of 4.807% of the total national production. However, the growth of rice production in North Sumatra Province has decreased by -8.74% per year (Table 1) making North Sumatra the province that has the highest decline in rice productivity compared to other provinces.

Table 1. Average Rice Productivity in Indonesia in 2015-2021

No	Province	Average Production (tons)	Share (%)	Average of Growth (%)
1	East Java	11.355.250	17,29	-7,14
2	West Java	10.473.836	15,95	-4,76
3	Central Java	10.511.489	16,01	-3,76
4	South Sulawesi	5.309.534	8,086	-0,92
5	South Sumatera	3.751.362	5,713	-6,2
6	North Sumatera	3.156.193	4,807	-8,74

One of the rice producing areas is Asahan Regency. However, BPS data (2022) shows that rice production in Asahan Regency has decreased by 5,404.63 tons (-8.809%) in 2021. In 2021 where rice production in Asahan Regency was 55,945.63 tons, down from the previous year which reached production of 61,350.21 tons (Figure 1).



Figure 1. Graph of Rice Productivity Development in Asahan Regency in 2015-2021

Productivity in Indonesian dictionary is defined as the ability to produce something (product power) (Subandriyo, 2016). In agriculture, productivity is the ability of a production factor to obtain production results per unit area of land. Production and productivity are determined by many factors, such as soil fertility, varieties of planted seedlings, the use of adequate fertilizers (both type and dose), the availability of sufficient amounts of water, proper farming techniques, the use of adequate agricultural tools, and the availability of labor (Khayati, 2015).

Law Number 18 of 2012 concerning Food, the achievement of food security is directed by increasing the production of agricultural commodities for diverse foods by applying the principles of comparative and competitive advantage, efficiency and competitiveness. The progress of the agricultural sector is marked by increasing production and productivity of food commodities in the end able to increase farmers' incomes (Ministry of Agriculture, 2021). Based on this, it is known that the development of the agricultural sector, especially rice productivity, has a very important role and strategy in supporting the lives of most of the Indonesian population. However, in increasing rice production, farmers often face problems such as erratic rain patterns and attacks by Plant Disturbing Organism (OPT). The lack of knowledge of farmers in dealing with the above problems results in a decrease in production due to crop failure. One way that is considered effective is to use an extension approach by streamlining the role of agricultural extension workers.

Kusnadi (2011) found that in an effort to achieve independence and also improve the welfare of farmers, extension activities are very effective to help farmers achieve their desired goals. With agricultural extension, agricultural development will increase which is directly related to increasing human resources, especially the farmers themselves, because in the process of cultivation, farmers are the ones who regulate their growth and farming business.

The executors of this counseling activity are the so-called extension workers or extension workers. Extension workers are expected to be able to act as agents who are able to increase the effectiveness and empowerment of farmers. Yuniarti and Haryanto (2017) stated that extension workers are very much needed in empowering and bathing farmers both independently and institutionally. The role of extension workers as educators, leaders, and advisors is very necessary in order to be able to identify and solve problems. Extension workers will guide, and motivate farmers so that they are able to change the way of thinking and how to act to be more independent and efficient.

The role of extension workers in this case is supported and strengthened by the existence of Republic Indonesian Law No. 16 of 2006 related to the function of agricultural extension workers as facilitators of learning activities, facilitating access to information and technology, developing leadership capabilities, growing awareness of the sustainability of environmental functions, and developing their organizations so that they have competitiveness. Farmers' perception of the role of

extension workers can be seen through the participation of farmers in an activity, it is suspected that if the farmer's perception of the role of extension workers is good, farmers will participate in activities held and attended by extension workers.

According to Ginting and Andari (2020), counseling as a motivator in the delivery of knowledge in agricultural development is expected to educate, facilitate farmer groups in instilling an understanding of attitudes to the application of modern agricultural technology from government program policies.

According to Nurjaya (2018), agricultural extension workers in their activities as agents of change in development always provide directions that can awaken the awareness of agricultural business actors. Counseling is one of the non-formal education provided to farmers in the form of assistance to increase their productivity in the farming business.

Setiana in Guniwa (2016) said that extension workers must pay attention to the following things in carrying out counseling activities:

1. Extension workers are the process of developing individuals and groups to improve the welfare of society so as to increase their dignity and dignity.
2. Extension workers are jobs that must be aligned with the indigenous culture of the local community.
3. Extension is a two-way process and should be Continuing education, an example in terms of guiding.
4. Extension workers must live by being interconnected, respectful, and trusting each other.
5. Extension workers must be able to cultivate the underlying ideals of creative, dynamic, and innovative thinking.
6. The extension officer must refer to the realities and always be adapted to the circumstances at hand.

Based on current data showing that there are still many farmers who experience crop failure and the welfare of the farmers themselves, this explains that agricultural extension still needs to develop its role as a solution or change that can help farmers to be more independent in facing problems that occur in complex farming businesses (Sapar, 2012).

According to research conducted by Nurul Qayyimah (2020) entitled the role of extension workers in empowering paddy rice farmers in kampili Pallangga District, Gowa Regency. This study used several data processing techniques such as frequency tables and correlation tests. The result of this study is that the role of extension workers in Kampili Village is good, which means that extension workers are able to develop changes in attitudes and behaviors that are more positive from farmers. Extension workers in Kampili Village are relatively very important as marketing partners, environmental analyzers, farmer assistants, motivators and relatively act as facilitators in the sense that extension workers are able to help farmers get help from the agricultural office. The level of empowerment of farmers is also very evident in relation to the role of extension workers as facilitators, marketing partners, environmental analyzers, farmer assistants, and motivators.

In a study conducted by Sianturi, N.L.M. (2019) entitled the role of extension workers in the development of farmer groups in Barumon District, Padang Lawas Regency, North Sumatra Province. The results of the study were the level of the role of extension workers in the development of farmer groups, namely 83%, while the correlation results that the role of extension workers as motivators, facilitators and manisators had a relationship with the development of farmer groups.

According to the results of Riadi's research (2018), extension activities are filled with the delivery of material by agricultural extension agents to assist farmers in overcoming pests of onion plant diseases, namely the use of organic matter, crop rotation in order to break the life cycle of onion plant disease pests, soil pH measurement and rice planting during the rainy season.

According to Bursten's research (2021) the grower standard is a widely used but rarely discussed benchmark concept that underlies the protocols used in agricultural experiments. It is not a one-size-fits-all standard but a product of local and active interaction between farmers and agricultural extension workers. The standards of the grower are in some ways similar to the better known

epistemic objects discussed in the philosophy of experimentation, such as control or background conditions. However, the standards of farmers are epistemically new, due to how the knowledge arising from them is co-produced by farmers and agricultural extension specialists. Explore the role of extension work in shaping agricultural culture more broadly.

Based on the above problems, the author aims to know and analyze the influence of the role of agricultural extension agents on the productivity of paddy rice in Asahan Regency.

RESEARCH METHODS

The study was conducted in Asahan Regency, North Sumatra Province. The determination of the research area was carried out purposively (deliberately) with the consideration that the Asahan Regency area is one of the regencies in North Sumatra Province and has a relatively not ideal number of extension workers. The data collection technique chosen is to use Primary data obtained from direct surveys conducted at the research site and secondary data as supporting data.

The sampling method used is the Stratified Proportional Random Sampling method. Where the population is divided into several levels (stratification) based on the inherent character of the farmers who are respondents are farmers from the 3 largest districts as rice production centers in Asahan Regency. The sub-districts that are the object of research are Rawang Panca Arga, Sei Kepayang and Meranti districts. The following is the distribution of research samples (Table 2).

Table 2. Distribution of Research Samples

No	Disctrict	Population	Sample
1	Rawang Panca Arga	3.308	145
2	Sei Kepayang	2.128	93
3	Meranti	2.977	130
Total		8.413	368

The variables and indicators in this study are presented in Table 3.

Table 3. Research Variables and Indicators

Variable	Indicators	Scale
The role of extension workers as motivators	1. Extension workers encourage farmers to participate in opt control activities	Ordinal
	2. Extension workers encourage farmers to attend training	
	3. Extension workers encourage farmers to participate in solving problems that exist in farmer groups.	
	4. Extension workers encourage farmers to implement appropriate opt controls.	
	5. Encourage farmers in the use of organic fertilizers / natural pesticides	
	6. Extension workers foster the enthusiasm of farmers in managing farming businesses	
The role of extension workers as educators	1. The ability of extension workers to deliver material on integrated pest control systems	Ordinal
	2. The ability of extension workers to demonstrate the manufacture of biological agents	
	3. The ability of extension workers to increase farmers' knowledge of new ideas in pest control	
	4. Ability of extension workers in providing OPT control training to farmers	
	5. Extension workers always provide regular assistance in terms of controlling pests	
	6. Extension workers have the ability to provide training and assistance materials in accordance with the problems faced by farmers.	
	7. Extension workers are able to demonstrate how to produce organic-based OPT controllers	

Extension workers as communicators	<ol style="list-style-type: none"> 1. Extension workers help farmers to be able to find and use internal resources where the resources in question can be in the form of financial support, knowledge of solutions and knowledge in diagnosing problems in farm bookkeeping, determination of capital 2. Extension workers help farmers to be able to find and use external resources where the resources in question can be in the form of financial support, knowledge of solutions and knowledge in diagnosing problems in farm bookkeeping, determination of capital 3. Extension workers convey related information to farmers clearly. 4. Extension workers convey information related to access to government assistance. 5. Extension workers convey information and innovations in the latest OPT control technology 	Ordinal
The role of extension workers as facilitators	<ol style="list-style-type: none"> 1. Extension workers provide facilities in the form of adequate equipment in the extension activities of integrated pest control programs 2. Extension workers facilitate farmers to obtain bacterial isolates to make their own biological agents 3. Extension workers have the ability to assist farmers in implementing organic pest control. 4. Extension workers provide good consultation to farmers. 5. Extension workers help form farmer groups 6. Extension workers assist farmers in accessing agricultural facilities and infrastructure. 7. Extension workers assist farmers in preparing work programs and design of farm business work programs 	Ordinal

Data analysis using the description method is by providing an overview of the research area and the characteristics of respondents in the form of graphs and tables accompanied by percentage numbers to make them easier to understand. Furthermore, it is explained in a narrative description descriptively.

RESULTS AND DISCUSSION

Hypothesis Testing

Partial Least Squares (PLS) is a statistical method used to analyze the relationship between a set of predictor variables and a set of response variables. Hypothesis testing can be used in PLS analysis to determine whether there is a significant relationship between the predictor variables and the response variables.

According to Hair et al. (2017), the process of hypothesis testing in PLS involves the following steps:

1. State the null and alternative hypotheses: The null hypothesis (H0) is the assumption that there is no significant relationship between the predictor variables and the response variables, while the alternative hypothesis (Ha) is the opposite.
2. Determine the level of significance (alpha): The level of significance (alpha) is the probability of rejecting the null hypothesis when it is true. The commonly used alpha level is 0.05, meaning that there is a 5% chance of rejecting the null hypothesis when it is actually true.
3. Calculate the t-value: The t-value is a measure of how different the estimated path coefficients are from zero, expressed in standard errors. The estimated path coefficients are obtained

through the PLS analysis. The t-value can be calculated by dividing the estimated path coefficient by its standard error.

4. Calculate the p-value: The p-value is the probability of observing a t-value as extreme or more extreme than the observed t-value, assuming that the null hypothesis is true. The p-value can be calculated using a t-distribution table or statistical software.
5. Compare the p-value with the level of significance: If the p-value is less than the level of significance, you can reject the null hypothesis and accept the alternative hypothesis. If the p-value is greater than the level of significance, you fail to reject the null hypothesis.

In summary, the process of hypothesis testing in PLS involves calculating the t-value and the p-value to determine whether there is a significant relationship between the predictor variables and the response variables. The estimated path coefficients obtained through the PLS analysis are used to calculate the t-value, and the p-value is calculated assuming that the null hypothesis is true. The level of significance is used to determine the threshold for accepting or rejecting the null hypothesis. Hypothesis testing can use the t-table value, for alpha 5% is 1.96. The hypothesis is accepted if t-statistics > t-table and the hypothesis is rejected if t-statistics < t-table.

The results of direct effect hypothesis testing on the model can be seen in Table 1 which the hypothesis of the influence of Pest Management on Farmer Capabilites and Extensionist Role on Pest Management is declared accepted. The result of indirect effect hypothesis testing can be seen in Table 1 which the hypothesis of the Extensionist Role on Farmer Capabilities is declared accepted.

Table 4. PLS output

Path	Std Beta	Std Error	t-value	p-value	Effect	Decision
Pest Management -> Farmer Capabilities	0.957	0.023	42.273	0	Direct Effect	Accepted
Extensionist Role -> Pest Management	0.969	0.014	71.166	0	Direct Effect	Accepted
Extensionist Role -> Farmer Capabilities	0.927	0.032	28.829	0	Indirect Effect	Accepted

Pest Management on Farmer Capabilities

Pest management is the process of controlling and managing pests that damage crops, reduce yields, and threaten food security. Effective pest management is essential for farmers to protect their crops and ensure a stable food supply. However, pest management can be challenging, especially for small-scale farmers who may lack the resources and knowledge needed to implement effective pest control strategies.

Farmer capabilities refer to the knowledge, skills, and resources that farmers possess or have access to. Farmer capabilities play a crucial role in pest management, as farmers who have the necessary knowledge and resources are better equipped to control pests and mitigate their impact on crops.

Research has shown that farmer capabilities are a key factor in the success of pest management strategies. Farmers who had a better understanding of pest management practices were more successful in controlling pests and increasing crop yields.

Another study found that farmers who had access to training and information on pest management were better able to control pests and reduce crop losses.

In addition to knowledge and training, access to resources such as pesticides, crop varieties, and tools is also important for effective pest management. However, it is important to note that the use of pesticides should be carefully managed to ensure that they are used safely and effectively, and do not have negative impacts on the environment or human health.

Farmer capabilities are essential for effective pest management, and efforts to improve farmer capabilities through training, education, and access to resources can help to ensure a stable and sustainable food supply

Extensionist Role on Pest Management

The extensionist role is a key component of pest management, as extensionists play an important role in providing farmers with the knowledge, resources, and support needed to effectively control and manage pests.

Extensionists are trained professionals who work with farmers to provide them with information and support on a wide range of agricultural issues, including pest management. They work closely with farmers to understand their needs and constraints, and provide them with tailored recommendations and solutions to address pest problems.

Extensionists play a critical role in pest management by providing farmers with information on pest identification, monitoring, and control strategies. They can help farmers to identify pest species, assess their impact on crops, and develop effective pest control plans.

Extensionists can also provide farmers with information on the safe and effective use of pesticides, and help them to develop integrated pest management (IPM) strategies that incorporate a range of pest control measures, including cultural, biological, and chemical control methods.

In addition to providing information and support on pest management, extensionists can also play a role in monitoring and evaluating pest management programs. They can help to assess the effectiveness of pest control measures, identify areas for improvement, and provide feedback to farmers and other stakeholders.

The extensionist role is essential for effective pest management, as it provides farmers with the knowledge, resources, and support needed to control and manage pests in a sustainable and effective way. By working closely with farmers, extensionists can help to improve pest management practices, increase crop yields, and promote sustainable agriculture.

Extensionist Role on Farmer Capabilities

The extensionist role is critical to improving farmer capabilities, as extensionists work directly with farmers to provide them with the knowledge, skills, and resources needed to improve their agricultural practices and increase their productivity.

Extensionists are trained professionals who work in partnership with farmers to provide them with information and advice on a wide range of agricultural issues, including crop production, pest management, soil fertility, and irrigation. They work closely with farmers to understand their needs and constraints, and provide them with tailored recommendations and solutions to improve their farming practices.

Extensionists play a critical role in improving farmer capabilities by providing farmers with access to information and training on the latest agricultural practices and technologies. They can help farmers to adopt new farming techniques, such as conservation agriculture or integrated pest management, and provide them with information on the safe and effective use of fertilizers, pesticides, and other inputs.

In addition to providing information and training, extensionists can also help to build the capacity of farmers by providing them with access to resources and technologies that can improve their productivity. For example, extensionists can help farmers to access high-quality seeds, irrigation systems, and other inputs that can improve crop yields and reduce production costs.

Extensionists can also play a critical role in building networks and linkages between farmers, research institutions, and other stakeholders. By facilitating knowledge-sharing and collaboration, extensionists can help to ensure that farmers have access to the latest research and information on agricultural practices, and can connect farmers with markets and other opportunities.

The extensionist role is essential for improving farmer capabilities and promoting sustainable agriculture. By working closely with farmers to provide them with information, training, and resources, extensionists can help to improve agricultural practices, increase productivity, and promote food security and rural development.

CONCLUSION

In conclusion, the interrelated nature of farmer capabilities, pest management, and the extensionist role is critical for achieving sustainable and effective agriculture. Farmer capabilities are essential for effective pest management, as farmers need the knowledge and skills to manage pests in a sustainable and efficient way. The extensionist role plays a crucial part in improving farmer capabilities and providing farmers with the necessary resources and support to effectively control and manage pests. By working together, farmers and extensionists can create more sustainable and productive farming systems that promote food security and rural development.

Recommendations for improving farmer capabilities and pest management include investing in education and training programs that provide farmers with the knowledge and skills needed to adopt sustainable agricultural practices. Additionally, providing farmers with access to resources such as high-quality seeds, irrigation systems, and other inputs can help to improve their productivity and reduce their reliance on chemical pesticides. Finally, promoting integrated pest management strategies that incorporate a range of pest control measures, including cultural, biological, and chemical control methods, can help to reduce pesticide use and promote more sustainable pest management practices.

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