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The Role Of Agricultural Extension Workers In Encouraging The Implementation Of Sustainable Agriculture Among Rice Farmers In Dutohe Village, Kabila District

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Abstract

This study aims to analyze the role of agricultural extension workers in encouraging the implementation of sustainable agriculture among rice farmers in Dutohe Village, Kabila District, Bone Bolango Regency. Some farmers in Dutohe Village still apply cultivation patterns that do not pay attention to environmental sustainability aspects. Limited knowledge regarding environmentally friendly cultivation techniques also affects the level of implementation of sustainable agriculture. Information regarding agricultural technology is often not fully understood by farmers. This situation indicates that the process of knowledge transfer and innovation still needs to be strengthened through effective agricultural extension activities. The number of samples in this study was 69 rice farmers who were determined as research respondents. Data analysis used quantitative descriptive analysis using Likert scale measurements. The results showed that the role of agricultural extension workers as program designers obtained a score of 79.78% (fairly good), the role as information disseminators obtained a score of 76.09% (fairly good), and the role as technical assistants obtained a score of 82.86% (fairly good). These results indicate that extension workers have carried out their roles but not yet fully optimally.

Keywords: Sustainable Agriculture; The Role of Agricultural Extension Workers; Rice Farmers .

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INTRODUCTION

Paddy rice is a food crop that plays a crucial role in meeting the food needs of the Indonesian people. Paddy rice plays a crucial role in the national economy as a staple food for Indonesians, and rice farming can open up job opportunities and provide income for those who depend on the agricultural sector for their livelihoods (Dunggio et al., 2023) . To date, the development of food crops such as paddy rice remains a top priority in the agricultural sector. As the population grows and consumption habits continue to evolve, it is necessary to improve the quality of the food supply (Sari et al., 2025) .

Data from the Central Statistics Agency (BPS) shows fluctuations in harvested area and rice productivity in Gorontalo Province. In 2023, it reached approximately 251.43 thousand tons of dry milled rice, with a harvested area of approximately 46.61 thousand hectares. This production increased by approximately 4.70 percent compared to the previous year (BPS Gorontalo Province, 2024) . Bone Bolango Regency is one of the rice-producing areas in Gorontalo Province, contributing to this production, with a production of 30,177 tons of dry milled rice. These data indicate that the lowland rice cultivation sector plays a significant role in the regional economy and in meeting the food needs of the local community.

The sustainability of lowland rice farming is not only related to the ability to produce, but also to the consistency of cultivation practices implemented by farmers. Agricultural extension workers play a role in supporting this process by imparting knowledge and implementing innovations to farmers. (Padillah et al., 2018) stated that the role of extension workers in increasing rice production is quite good, although its implementation is influenced by the intensity of interaction between farmers and extension workers. Agricultural extension workers play a role in helping farmers understand and apply knowledge related to lowland rice cultivation. The assistance provided includes cultivation techniques, utilization of production facilities, control of plant pests, and farm management. The implementation of innovations requires not only the delivery of information, but also explanations, practical examples, and direct assistance so that farmers can implement them.

In promoting the implementation of sustainable agriculture in lowland rice, agricultural extension workers play a role in guiding farmers to maintain productivity without neglecting resource sustainability. This guidance includes appropriate input use, selection of cultivation technologies, land and water management, and environmentally friendly pest and disease control. According to (Gunawan et al., 2019), agricultural extension workers are positioned as

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strategic liaisons who bridge the transfer of innovation to farmers, as extension workers have interrelated roles in encouraging the adoption of environmentally friendly agricultural practices.

The implementation of sustainable agriculture in lowland rice farming still faces various obstacles. One example is in Dutohe Village, Kabila District, Bone Bolango Regency, where some farmers still employ cultivation methods that pay little attention to environmental sustainability. Excessive use of chemical fertilizers and pesticides is often found in farming practices at the farmer level. This condition has the potential to degrade soil quality and disrupt the balance of the agricultural ecosystem. Furthermore, limited knowledge of environmentally friendly cultivation techniques also affects the level of sustainable agriculture implementation. Information on agricultural technology is often not fully understood by farmers. This situation indicates that the process of knowledge transfer and innovation still needs to be strengthened through effective agricultural extension activities. Another obstacle is the difference in perceptions between extension workers and farmers. Farmers' readiness to receive information also varies depending on their level of education and experience. This condition hinders the optimization of the extension function in encouraging changes in agricultural practices. Limited resources are a major obstacle in achieving program targets.

Based on the background described above, the researcher is interested in conducting research on "the role of agricultural extension workers in encouraging the implementation of sustainable agriculture among rice farmers in Dutohe Village, Kabila District, Bone Bolango Regency", to determine the extent of the contribution of extension workers in increasing understanding of sustainable agricultural practices at the rice farmer level in Dutohe Village, Kabila District, Bone Bolango Regency.

REVIEW OF AGRICULTURAL EXTENSION WORKERS

Agricultural extension workers are agents who influence the effectiveness of agricultural extension services in increasing agricultural productivity and farmer welfare. Competent extension workers not only master agricultural science and technical skills, but also possess communication, managerial, and social skills, which are crucial for facilitating effective interactions (Sulaiman, 2025) . Essentially, agricultural extension workers are tasked with encouraging farmers to change their ways of thinking, working, and living to better align with current developments and more advanced agricultural technology.

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Extension workers are at the forefront of Indonesian agricultural development, meaning that agricultural victories are ultimately in their hands. They can engage directly with farmers, enabling agricultural projects to be implemented or delivered directly to them, requiring them to possess high levels of competence and performance (Razak et al., 2021) . Research (Amin et al., 2026) also explains that agricultural extension is a strategic instrument in the process of disseminating technology and information to farmers to increase productivity and efficiency of farming businesses.

Minister of Agriculture Regulation Number 09 of 2023 concerning technical guidelines for functional positions of agricultural extension workers explains that agricultural extension workers are employees assigned the duties, responsibilities, authority, and rights to carry out agricultural extension activities. Agricultural extension itself is a learning process aimed at helping farmers and agricultural business actors acquire knowledge, skills, access to technology, information, capital, and other resources to increase productivity, income, and welfare, while simultaneously preserving the environment.

Furthermore, the regulation explains that the primary task of agricultural extension workers is not only to convey information to farmers, but also to evaluate extension activities and develop more effective extension methods tailored to farmers' needs. Thus, agricultural extension workers act as a liaison between sources of agricultural innovation and technology and farmers, the users of that technology.

An agricultural extension worker needs to be able to analyze the various needs and constraints experienced by farmers and communicate these effectively to the farmers targeted by the extension worker, so that they can accept and implement the technology presented by the extension worker. According to (Bahua, 2016) , it is emphasized that in order to work well, agricultural extension workers must carry out their primary responsibilities. Agricultural extension workers must possess various skills, including communication skills, broad knowledge, independence, and the ability to position themselves according to the characteristics of farmers.

LITERATURE REVIEW OF THE ROLE OF AGRICULTURAL EXTENSION WORKERS

In the context of agricultural development, agricultural extension workers play a strategic role in supporting farmers to optimize production, both in terms of quantity and quality, as an effort to improve their welfare. According to (Faisal, 2020), agricultural extension workers play a crucial role in the agricultural sector development process because they function as agents of

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change at the forefront of direct interaction with farmers. In this context, extension workers act as empowerment facilitators, encouraging farmers to achieve independence in managing their farming businesses. This independence includes farmers' ability to think rationally, take appropriate actions, and control and manage farming activities independently.

According to (Munifah et al., 2025) there are three main roles carried out by agricultural extension workers to carry out their responsibilities, each role has a strategic function in supporting the success of the program, especially in the context of farmer empowerment.

1. The role of extension workers as program designers

   As program designers, agricultural extension workers are tasked with developing programs and activity plans in their work areas, aimed at improving farmer productivity and welfare. These programs can encompass various aspects, such as agricultural technology development, improving crop quality, crop diversification, and farm management. The primary goal of agricultural extension workers as program formulators (program designers) is to improve farmer welfare by increasing farm productivity.

   Based on the tasks and functions in extension planning, the indicators of the role of extension workers as program designers can be explained as follows.

   1) Program preparation according to regional conditions, namely the ability of extension workers to prepare programs that are appropriate to the characteristics of the land, resources, and socio-economic conditions of farmers.
   2) Planning activities that support sustainable agriculture, namely the ability of extension workers to design activities that encourage the implementation of sustainable agricultural practices such as the use of organic fertilizers, integrated pest control, and environmental conservation.

2. The role of extension workers as information disseminators

   As information disseminators, agricultural extension workers are tasked with disseminating information, ideas, innovations, and new technologies to farmers, as well as implementing agricultural extension methods in their assigned areas. As innovators, agricultural extension workers are also expected to possess innovative skills and agribusiness insights to develop new ideas to improve farmer welfare. Furthermore, they must possess the ability to disseminate innovations and new information to farmers in language they can easily understand.

   The indicators of the role of extension workers as information disseminators include:

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1) Clarity of information means that the information provided by extension workers is easy for farmers to understand.
2) Completeness of information, namely extension workers provide sufficient information regarding sustainable agricultural technology, programs and practices.

3. The role of extension workers as technical assistants

The role of extension workers as technical assistants is to provide guidance, training, and assistance in the form of demonstrations and examples of field implementation. Assistance is provided from land preparation, planting, plant maintenance, and harvest. Technology and innovation require direct guidance and direction from extension workers to ensure their effective implementation by farmers. In this role, extension workers help farmers overcome technical challenges and ensure the successful implementation of sustainable agriculture.

Based on the concept of assistance in agricultural extension, indicators of the role of extension workers as technical assistants can be measured through the following aspects:

1) Assistance in solving farming problems, namely extension workers helping farmers identify and resolve problems that arise in cultivation activities.
2) Field visits and guidance, namely extension workers actively conducting visits to monitor and guide farmers in the field.

Agricultural extension workers play a crucial role in farmer empowerment through their functions as program designers, information disseminators, and technical advisors. These roles mutually support each other in improving farmers' knowledge, skills, and attitudes. Therefore, the presence of extension workers significantly impacts yield improvements and farmer welfare.

LITERATURE REVIEW OF SUSTAINABLE AGRICULTURE

Sustainable agriculture is one form of implementation of the concept of sustainable development that is essential to face future challenges (Hammada, 2024) . According to (Hadiwiyono, 2025) sustainable agriculture is defined as an approach to agricultural resource management designed to meet the needs of current and future generations through efforts to maintain and improve environmental quality, while preserving natural resources.

Sustainable agriculture is a form of farming that optimally utilizes and conserves resources to produce agricultural products. This is achieved through the use of proportional production facilities and expenditures, while maintaining a balance between social, economic, and

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environmental sustainability. Furthermore, sustainable agricultural practices emphasize the use of renewable production inputs and the long-term sustainability of resources (Rachmawatie et al., 2020) .

According to (Saputro et al., 2024), the concept of sustainable agriculture focuses on environmentally friendly agricultural management efforts to reduce the risk of environmental damage and increase agricultural commodity yields. The impact of sustainable agricultural development is reflected in increased farmer incomes, resulting in more stable and prosperous social and economic conditions.

Factors that must be considered in sustainable agriculture include the use of environmentally friendly technologies, sustainable natural resource management, and empowerment of local communities. Furthermore, sustainable agriculture must also consider local wisdom and culture in developing the agricultural sector. To achieve this, sustainable agricultural development efforts can be carried out by applying three basic principles as guidelines for maintaining sustainability, including:

1. Ecological principles

   This principle can be developed by applying the relationships between organisms found in nature, transforming them into a unified whole. This can be achieved by optimally utilizing the components of air, soil, and water, along with the climate and diversity within them. This approach does not involve large-scale exploitation, but rather uses only what is necessary. Conservation efforts must also be carried out in tandem with utilization.

2. Production principles

   Technically, the principle of production can be achieved using organic principles. The basis for choosing organic principles can begin with a gradual transition from conventional land use to sustainable agriculture. This relates to fertilization methods, soil cultivation, pest and disease management, and a combination of appropriate technology. Optimizing these steps also requires considering the physical conditions of the cultivation site.

3. Principles of socio-economic aspects

   This aspect emphasizes both social and economic efficiency, with the ultimate goal of farmer well-being and profitability. The promotion of local wisdom is also highlighted by the establishment of a sustainable agricultural system where local wisdom is highly valued. Equally important is the discussion of equality between women and men, which promotes sustainable agricultural independence.

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RESEARCH METHODS

This study uses a quantitative descriptive approach to examine events that have occurred and analyze the factors that caused them. The research location was selected purposively , namely Dutohe Village, Kabila District, Bone Bolango Regency, considering that there are active extension activities in the village. The sample determination in this study used a *total sampling technique* , where the number of samples is equal to the number of populations, namely 69 respondents.

The data used in this study comprises primary and secondary data. Primary data is obtained through direct field observations and direct interviews with respondents using a questionnaire. Secondary data, on the other hand, is obtained from various literature related to the research topic, such as data from the Kabila BPP, journals containing research results related to this study, and other reliable sources. Data collection methods include interviews, observations, and questionnaires.

The data analysis technique used is analysis A quantitative descriptive analysis using a Likert scale. This analysis is used to provide an overview of the research object's condition based on data obtained from respondents. The questionnaire data is first processed by calculating the frequency of respondents' answers to each statement using the following formula:

$$\mathbf{P = \frac{f}{n} X\ 100\%}$$

Where:

P = Percentage
F = Frequency of Respondents' Answers
n = Number of Respondents
100% = Fixed Number

Next, to determine the level of achievement of each statement and indicator, the percentage score is calculated using the following formula:

$$\%\ \boldsymbol{Skor\ Pernyataan} = \frac{\boldsymbol{Skor\ Aktual}}{\boldsymbol{Skor\ Ideal}}\ \boldsymbol{x100\%}$$

Where:

a. The Actual Score is the score obtained from all respondents' answers to the questionnaire that has been submitted.
b. The ideal score is the maximum score or the highest possible score that could be obtained if all respondents chose the answer with the highest score.

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RESULTS AND DISCUSSION

The Role of Agricultural Extension Workers in Dutohe Village, Kabila District

The role of agricultural extension workers in this study was analyzed through three aspects: program designers, information disseminators, and technical assistants. Each aspect consists of two indicators that describe how extension workers carry out their role in supporting rice farmers in implementing sustainable agriculture in Dutohe Village, Kabila District, Bone Bolango Regency.

The Role of Extension Workers as Program Designers

As program designers, agricultural extension workers are tasked with developing programs and activity plans in their work areas, aimed at improving farmer productivity and welfare. These programs can encompass various aspects, such as agricultural technology development, improving crop quality, crop diversification, and farm management. The role of extension workers as program designers in Dutohe Village, Kabila District, Bone Bolango Regency is presented in the following table:

Table 1 The Role of Extension Workers as Program Designers in Dutohe Village

No	Statement Score								Criteria
	F1	F2	F3	F4	F5	Current	Ideal	%	
P-1	0	0	1	28	40	315	345	91.30	Good
P-2	0	1	26	35	7	255	345	73.91	Fairly good
P-3	0	0	13	33	23	286	345	82.90	Fairly good
P-4	11	26	32	0	0	159	345	46.09	Poor
P-5	0	0	0	23	46	322	345	93.33	Good
P-6	0	0	0	24	45	321	345	93.04	Good
P-7	1	4	38	24	2	229	345	66.38	Fairly Poor
P-8	0	0	0	30	39	315	345	91.30	Good
Total	**12**	**31**	**110**	**197**	**202**	**2202**	**2760**	**79.78**	**Fairly Good**

Source: Processed Results 2026

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Based on the table above, it can be concluded that the role of agricultural extension workers in carrying out their program design function in Dutohe Village, Kabila District, Bonebolango Regency achieved an achievement of 79.78% and is in the fairly good category. This value indicates that the extension program development process has been carried out by considering regional conditions and farmer needs and is directed at activities that can support the implementation of sustainable agriculture. These results are in line with a study (Bahua, 2022) on agricultural extension program planning in regulating lowland rice cropping patterns in North Gorontalo Regency. This study indicates that the development of extension programs is one of the elements supporting the implementation of lowland rice farming activities. (Dea et al., 2024) stated that the existence of extension workers has a strategic role in supporting sustainable agricultural development which is realized through various functions, such as educators, motivators, communicators, facilitators, organizers, dynamicators, and innovators. Based on these results, the achievement of 79.78% can be interpreted as meaning that extension workers in Dutohe Village have been quite capable of carrying out their role as program designers, although the implementation is not yet fully optimal. This condition can be caused by the differences in needs and problems faced by each farmer and the limitations of extension workers in accommodating all these needs into extension programs. Therefore, program planning needs to be continuously improved by identifying farmer needs and involving farmers in determining extension activities, so that the designed program is not only appropriate to regional conditions, but also able to encourage the implementation of sustainable agriculture more effectively.

The Role of Extension Workers as Information Disseminators

As information disseminators, agricultural extension workers are tasked with disseminating information, ideas, innovations, and new technologies to farmers, as well as implementing agricultural extension methods in their assigned areas. The role of extension workers as information disseminators in Dutohe Village, Kabila District, Bone Bolango Regency is presented in the following table:

Table 2 The Role of Extension Workers as Information Disseminators in Dutohe Village

No	Statement Score								Criteria
	F1	F2	F3	F4	F5	Current	Ideal	%	
P-1	0	0	1	31	37	312	345	90.43	Good

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P-2	0	0	12	39	18	282	345	81.74	Fairly Good
P-3	0	0	8	37	24	292	345	84.64	Good
P-4	14	30	24	1	0	150	345	43.48	Poor
P-5	0	0	2	33	34	308	345	89.28	Good
P-6	0	0	0	12	57	333	345	96.52	Good
P-7	1	3	38	26	1	230	345	66.67	Fairly Poor
P-8	5	14	40	10	0	193	345	55.94	Fairly Poor
Total	**20**	**47**	**125**	**189**	**171**	**2100**	**2760**	**76.09**	**Fairly Good**

Source: Processed Results 2026

Based on the table above, it can be concluded that the role of agricultural extension workers as information disseminators in supporting the implementation of sustainable agriculture by rice farmers in Dutohe Village, Kabila District, Bonebolango Regency achieved a score of 76.09%, which is within the fairly good criteria. This achievement indicates that extension workers have strived to meet the information needs of farmers, both regarding the implementation of rice cultivation and various aspects related to sustainable agriculture. The results of this study align with research by Mandey et al., 2024. which states that agricultural extension workers function as intermediaries in the process of conveying information to farmers. Information from research institutions and researchers is conveyed to farmers through extension activities so that it can be used to improve knowledge and the quality of rice farming management. Meanwhile, research (Dillah, 2024) stated that extension workers who act as educators and information disseminators are categorized as having a role in supporting the adoption process in lowland rice farming. Overall, the study categorized the role of extension workers as having a moderate role. These two previous studies support this study, which shows that extension workers have performed their information dissemination function quite well.

Despite being in the fairly good category, the achievement score of 76.09% indicates that the implementation of this role is not yet fully optimal. This may be related to the diversity of farmers' knowledge and experience, including differences in their ability to receive, understand, and implement the information obtained. Therefore, extension workers need to adopt an

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approach that focuses not only on information delivery but also on mentoring to ensure the information is understood and can be effectively applied in farming activities.

The Role of Extension Workers as Technical Assistants

The role of extension workers as technical assistants is to provide direction, training, and assistance in the form of demonstrations and examples of field implementation. Assistance is provided from land preparation, planting, plant maintenance, and harvest. Technology and innovation require direct direction and guidance from extension workers to ensure their effective implementation by farmers. The role of extension workers as technical assistants in Dutohe Village, Kabila District, Bone Bolango Regency is presented in the following table:

Table 3 The Role of Extension Workers as Technical Assistants in Dutohe Village

No	Statement Score								Criteria
	F1	F2	F3	F4	F5	Current	Ideal	%	
P-1	0	1	1	28	39	312	345	90.43	Good
P-2	0	0	1	36	32	307	345	88.99	Good
P-3	2	6	21	27	13	250	345	72.46	Fairly Good
P-4	0	0	12	50	7	271	345	78.55	Fairly Good
P-5	0	0	7	45	17	286	345	82.90	Fairly Good
P-6	0	0	9	31	29	296	345	85.80	Good
P-7	0	6	16	24	23	271	345	78.55	Fairly Good
P-8	0	1	7	34	27	294	345	85.22	Good
Total	**2**	**14**	**74**	**275**	**187**	**2287**	**2760**	**82.86**	**Fairly Good**

Source: Processed Results 2026

Based on the table above, it can be concluded that the role of agricultural extension workers as technical assistants in Dutohe Village, Kabila District, Bonebolango Regency obtained a score of 82.86% and is included in the fairly good criteria. This condition illustrates that the assistance activities carried out by extension workers have been running and are felt to be

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beneficial by farmers, especially through assistance in handling farming issues. Visits and technical guidance activities have a fairly important position because extension workers are required not only to provide knowledge or information, but also ensure that this knowledge can be understood and applied by farmers by adapting to the conditions of the farming business being run. The results of this study are in line with research (Yusnidarwati et al., 2024) . which states that the role of extension workers as mentors and consultants in rice farming is rated very good. The extension workers in this study were able to provide guidance and information to farmers, including introducing technologies that support farming activities. Research (Mulyadi et al., 2024) also explained that extension workers have a direct relationship with farmers and are expected to help provide solutions to problems that arise in rice farming. The results of these two studies reinforce the findings of research in Dutohe Village, Kabila District, Bonebolango Regency, which found that technical assistance is a crucial role of extension workers in supporting farming activities.

DISCUSSION

The role of agricultural extension workers in Dutohe Village achieved an actual score of 6,589 out of an ideal total score of 8,280, or 79.58%, categorized as Fairly good. These results indicate that the role of extension workers in Dutohe Village has been running quite well, but not yet fully optimized in all aspects. In their role as program designers, extension activities still need to be more tailored to the problems and needs of farmers. As information disseminators, extension workers have delivered materials on rice cultivation, fertilizers, pesticides, and agricultural technology, but this information does not fully cover farmers' needs, one example being information on the latest agricultural technology, which only reached 66.67%. Meanwhile, their role as technical assistants achieved higher results because extension workers were quite active in providing guidance, helping resolve cultivation problems, and conducting coaching and field visits. However, this assistance has not been fully intensively implemented for all farmers. This condition is in line with research (Iskandar et al., 2020) , which states that information provided by extension workers serves as one of the main references for farmers in adopting integrated crop management (ICM) technology. However, the implementation of ICM technology at the farmer level has not yet optimally covered all its components . The study also confirmed that farmers' limited access to information is a factor that needs to be considered in improving the role of extension workers.

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These results indicate that the role of extension workers is already quite significant in farmers' farming activities, but its implementation is still suboptimal. Farmers still require more tailored information, easier-to-implement technology delivery, and more regular mentoring. Therefore, the 79.58% achievement indicates that the role of extension workers has been quite effective, but still needs to be strengthened, particularly in program planning, information dissemination, and the intensity of mentoring. These results are supported by research (Rahyunanto et al., 2020) , which explains that extension workers play a role in disseminating information and helping farmers implement agricultural technology and innovation. However, limited time for extension workers is a barrier to mentoring. Similar results were also demonstrated by (Wicaksono, 2020) , who stated that extension workers play a fairly dominant role in guiding farmers and providing technical support in the field. However, the limited relationships between extension workers and research institutions have resulted in less than optimal transfer of information on new technologies to farmers. Based on the 79.58% achievement, the role of extension workers can be considered to have been implemented quite well. However, improvements are still needed, particularly in designing programs based on farmers' conditions and needs, expanding the delivery of information on the latest agricultural technologies, and increasing mentoring and coaching activities in the field.

CONCLUSION

Based on the research results, it can be concluded that the role of extension workers in encouraging the implementation of sustainable agriculture among rice farmers in Dutohe Village is in the fairly good category. This is evident from the implementation of three extension worker roles: the role as program designer (with a score of 79.78%), the role as information disseminator (with a score of 76.0%), and the role as technical assistant (with a score of 82.86%). These results indicate that extension workers have carried out the functions of planning, delivering information, and providing assistance to farmers, although there are still several aspects that need to be improved.

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SUGGESTION

The suggestions given are:

1. For agricultural extension workers, it is hoped that they will increase mentoring and coaching for farmers, especially in the implementation of environmentally friendly agricultural practices so that sustainable agriculture can be implemented more optimally.
2. For rice farmers, it is hoped that they can continue to participate in extension activities, apply the information and direction provided by extension workers, and increase the application of environmentally friendly agricultural practices so that the sustainability of farming activities can be maintained.

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