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CONSTRAINTS AND ROLE OF AGRICULTURAL EXTENSION PARTNERSHIPS IN APPLICATION RICE FIELD RICE CULTIVATION INNOVATIONS TO REALIZE FOOD SECURITY

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Abstract

Research in the long term aims to produce a partnership model in the application of lowland rice cultivation innovations to increase rice production to realize food security in the region in Aceh Province. In particular, this study aims to (1) identify and analyze the constraints in increasing rice production in Pidie Jaya Regency, (2) identify and analyze the role of agricultural extension partners in implementing innovations in lowland rice cultivation in Pidie Jaya Regency. This research is an action research on the application of innovation combined with a survey method which was carried out to see the pattern of partnerships in the application of innovation in lowland rice cultivation to realize food security in Pidie Jaya Regency. The location of this research was conducted intentionally in Pidie Jaya Regency. *Focus Group Discussion*) with stakeholders aboutthe potential role of each party in the partnership pattern. The results of the study showinnovations applied to lowland rice cultivation for food security include; superior seed innovation, land management, cropping system with agricultural mechanization, jajar legowo planting pattern, biological pest control (Rubuha), balanced fertilization and harvest implementation using agricultural mechanization. (1) constraint indicatorsthe availability of fertilizers (very constrained), pest and disease attacks, and the availability of extension workers, and the availability of agricultural tools and machinery (constrained) as well as garden patterns that are not simultaneously, the availability of irrigation water, and the low use of superior seeds are in the less constrained category. (2) farmers perceive the role of partners in implementing innovations in rice field cultivationlocal governments and farmers' institutions have played a role, while universities and the private sector/entrepreneurs are in the category of having quite a role.

Keywords: ***partnership, the role of partners, innovation, cultivation, rice, food security.***

1. INTRODUCTION

In the Aceh Province Long-Term Development Plan (RPJP) 2005-2025, the policy direction is to create a society that is able to fulfill people's lives economically, socially and spiritually. (1) food security stabilization which ensures food availability, especially from local production, (2) improvement and ability to access food, (3) development of processing and marketing technology and food institutions, (4) increased production, quality of regional mainstay food commodities, (5) improving infrastructure and rural economic institutions, (6) increasing the quantity and quality of food consumption, (7) improving nutritional status through preventive measures,

Aceh is one of the provinces in Indonesia which is one of the potential provinces for food

granaries. Rice fields are the main object of agricultural development in Aceh. In 2020 the harvested area of rice plants in Aceh is 310,012.46 ha with a production of 1,714,437.60 tons and a productivity of 5.53 tons/ha (BPS Aceh 2021)

One of the districts with great potential for the development of rice paddy commodities is Pidie Jaya Regency, which is one of the rice barns in Aceh Province with a harvested area of 17,117 ha and a production of 100,701 tons and a productivity of 5.88 tons/ha. Pidie Jaya Regency has 8 sub-districts that have different harvest areas, production, and productivity of rice plants. The following shows the harvested area, production and productivity of rice by sub-district in Pidie Jaya Regency. The data are presented in Table 1.

Table 1 Harvested area, rice production and productivity by sub-district in Pidie Jaya Regency 2020.

Subdistrict	Harvested Area (ha)	Production (tons)	Productivity (tonnes/ha)
Meureudu	**2.297**	**14,396**	**6.27**
Meurah Dua	1.161	7.172	6.18
Bandar Dua	4,524	26,184	5.79
Buying Term	1,201	7.174	5.97
Ulim	1997	12.626	6.32
Trienggadeng	2.110	12,380	5.87
Panteraja	570	3.294	5.78
new city	3.257	17,475	5.37
Pidie Jaya	**17.117**	**100.701**	**5.88**

Source: BPS Pidie Jaya Regency

This data shows that the average productivity is still very low when compared to the potential yield of lowland rice production. The application of various cultivation innovations ranging from the use of superior seeds, the application of appropriate cropping patterns, biological pest control is expected to be able to answer the constraints of the current low productivity of lowland rice. This effort must be supported by synergistic partnerships of actors in agricultural development activities, starting from universities, local governments, private parties, and farmer-level institutions.

Partnership, is a synergistic collaboration between two (or more) parties to carry out an activity (in action with). In this relationship, the cooperation is a social exchange that gives each other (social rewards), is reciprocal (dyadic), and accepts each other (reinforcement). This kind of relationship will last a long time if both parties feel mutually beneficial, but will soon break if one of the parties perceives subjectively (though not always real) feels disadvantaged. Therefore, the sustainability of partnerships, as happens in married life, must be based on the principles: (a) mutual need, (b) interdependence, (c) mutual trust, (d) mutual benefit, (e) mutual support, (f) build each other up, and (g) protect each other (Totok Mardikanto, 2009).

There are various obstacles faced by lowland rice farmers in carrying out their farming activities. According to Setia Budi (2014) the role of extension workers has been good in terms of growing the participation of lowland rice farmers but not yet optimal in the application of cultivation technology ranging from the use of superior seeds, application of appropriate cropping patterns, integrated pest control and harvest treatment so that it affects the low production and productivity of farmers. paddy rice,

According to Gana Pati Ojha and Stephen R. Morin (2002) in their research on Agricultural partnerships in Nepal; when multiple parties (GO, NGO or PO) institutions are involved in a partnership, their effectiveness generally increases. Different partners exhibit different strengths. NGOs are very effective in reaching resource-poor farmers, while GOs

(government) usually have greater technical capacity. Different partnerships are suitable for specific purposes. GO and PO (private view) partnerships are better for high-cost technology with a larger number of farmers, while GO and NGO partnerships are better for reaching smallholders.

Apart from the government, private sector and non-governmental organizations, higher education also plays a very important role in the process of adopting agricultural innovations to farmers. Higher education is a place to produce various agricultural innovations that are very useful for farmers in responding to various obstacles to lowland rice cultivation by farmers (Setia Budi et al. 2018)

Various obstacles faced by rice field farmers so that the low yields of their farming production include the low awareness and ability of farmers to use superior seeds. more than half of Indonesian farmers, including Acehnese farmers, still use seeds from the informal sector which supplies 70% of the seeds set aside from harvested grain. Efforts to encourage seed independence at the farmer level by promoting seed breeding with a partnership pattern between farmer groups with the government and universities (one of the sources of innovation) to answer the demands of increasing food production in a sustainable manner by using independent production inputs at the farmer level (Setia Budi, et al. . 2018).

Ahmed, AU et al (2016) and Himire, R et al (2015) The use of superior seeds in addition to having an impact on improving welfare will also reduce hunger and food insecurity in developing countries. This is also in line with the research of Achmad Rifa'I, Salman Samir. (2019) which states; The use of new (superior) seed varieties has a positive impact on farmers' welfare. Improved and good seeds will produce good quality rice so as to increase production and selling prices in the market and ultimately have an effect on improving the welfare of farmers for a better life.

In addition to the low use of superior seeds, pests and plant diseases in lowland rice cultivation are also a factor in low production yields. Rat attacks can eliminate 60-70% rice production and can even lead to puso or crop failure. Chemical control has not been very effective in reducing the rate of damage to paddy fields which can ultimately reduce production. The use of superior seeds will be more optimal if followed by the application of a package of cultivation technology for these superior varieties (Aswidinnoor, Hajiri. 2016).

Ecological control by using owls in several places has been able to show success in reducing the rat population in farmers' rice fields by implementing the RUBUHA (Owl House) innovation system. The development of the RUBUHA system is also expected to indirectly become a model for sustainable rat pest control and provide economic, social and environmental benefits (Martin, JM 2009, Setiabudi. J et al. 2015).

The application of lowland rice cropping patterns is also an influential part of production results. The use of the right cropping pattern will be with environmental conditions and the variety of pests and diseases will be related to the high and low yields of production. Hazton's cropping pattern technology is one technology that can be applied easily by farmers. Hazton's technology relies on the use of old seeds, which are 25-30 days after sowing with 20-30 stems/planting hole. The other components are more or less the same as the Integrated Crop Management (PTT) of Rice recommended by the Agency for Agricultural Research and Development (Balitbangtan).

This technology initiation is a form of participation in increasing rice productivity in Indonesia. Several important components of this technology are the use of an older seedling age (25-30 DAS), the number of seeds used per clump (25-30 seedlings), then using a wider spacing, using the jajar legowo system (2:1) with a spacing of 20 x 40 cm, the use of fertilizer doses of 10 percent is increased from the recommended dose.

Based on the results of research conducted by the rice research team of the Faculty of Agriculture, Malikussaleh University regarding the application of Hazton technology, this is the result of research (Maisura et al, 2019) The advantages of using this Hazton technology are resistance to golden snail attacks, no embroidery and no weeding, and faster harvest, can produce more pithy grain, which in turn will increase productivity.

The use of Hazton technology can produce production per hectare of Ciherang varieties reaching 12.5 tons, Inpari 32 varieties reaching 11.5 tons and Mekongga varieties reaching 10.6 tons. This figure exceeds the potential yield of each variety. This is because the older age of the seeds can reduce the golden snail pest attack, then the number of seeds used is more (30 Seeds)), the number of seeds is almost 90 percent productive with a low percentage of empty grain.

The use of the jajar legowo (2:1) system can reduce plant competition for nutrients, sunlight and water. Thus providing opportunities for better plant growth and development. The use of fertilizers that are higher than the recommended dose has its own reasons, the use of large numbers of seeds certainly requires a high intake of nutrients to support plant growth and development, which in turn can increase production (Maisura et al, 2019).

From this background, the objectives of this study include: (1) analyze the constraints in increasing rice production in Pidie Jaya Regency, (2) analyze the role of agricultural extension partners in implementing innovations in lowland rice cultivation in Pidie Jaya Regency to achieve food security in Pidie Jaya Regency.

2.RESEARCH METHOD

Research is a basic research related to the application of innovation combined with a survey method which was carried out to see the pattern of partnerships in implementing innovations in lowland rice cultivation to realize food security in Pidie Jaya Regency. The location of this research was conducted intentionally in Pidie Jaya Regency. The research data includes primary and secondary data starting from the identification of the characteristics of rice farmers in the research location and the role of each party involved in the partnership pattern in the application of agricultural innovation.

The research data includes primary and secondary data involving 105 respondents from farmer group members in the research location as well as FGD activities (*Focus Group Discussion*) with stakeholders aboutthe role of each party involved in the partnership pattern includes; Local Government, Higher Education, Agricultural Extension, private sector and farmer institutions. Furthermore, it also looks at the effect of the independent variable on the dependent variable and looks at the relationship between the variables in this study. The data of this study were analyzed qualitatively and quantitatively. In addition to qualitative descriptive data analysis, this study also uses quantitative analysis which will ultimately produce an overview of agricultural extension partnerships in the application of lowland rice cultivation innovations to increase production in Pidie Jaya Regency.

The stages of implementing cultivation innovations are carried out based on research that has been carried out, including the use of superior seeds and biological pest control that contribute significantly to increasing production (Maisura at all 2014, and Setiabudi, Eva, W. 2019).

Efforts to answer the role and constraints of the partnership, the steps taken are to carry out FGD activities (*Focus Group Discussion*) with stakeholders aboutthe role of each party involved in the partnership pattern for implementing agricultural innovation includes; Local Government, Higher Education, Agricultural Extension, private sector and farmer institutions. The flow chart of the partners' roles in this research can be seen in Figure 1 below:

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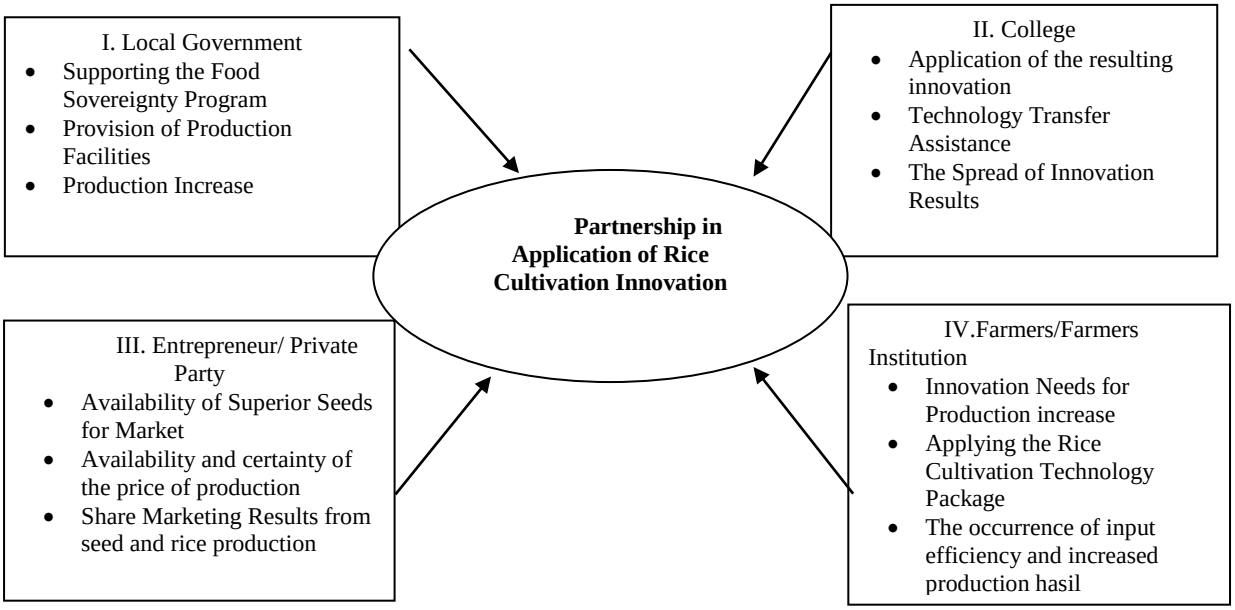

Figure 1. Partnership pattern for implementing agricultural innovation

3.RESULTS AND DISCUSSION

Pidie Jaya Regency is located at latitude 04º 06º - 044º 47º North Latitude, 95º 56º- 96º 30º East Longitude is one of the divisions of Pidie District in Aceh Province. Pidie Jaya Regency has an area of 1,162.84 Km², consisting of a land area of 952.0 km² (95.210.99 Ha based on GIS data) and a sea area of 210.85 km². Pidie Jaya Regency is located in the northern part of Bukit Barisan which consists of mountainous areas, lowlands and marine areas. Pidie Jaya Regency was born based on Law Number 7 of 2007, concerning the Establishment of Pidie Jaya Regency in the Province of Nanggroe Aceh Darussalam (State Gazette of the Republic of Indonesia of 2007 Number 9, Supplement to the State Gazette of the Republic of Indonesia Number 4683), on January 2, 2007

Pidie Jaya Regency is one of the rice barns in Aceh Province, with a rice planting area of 16,657 ha in 2019 and a harvested area of 16,654 ha, with a total rice production of 97,455 tons and a productivity of 5.85 tons/ha. Various innovations have been implemented in the process of lowland rice cultivation in Pidie Jaya Regency, both originating from extension workers as the spearhead of innovation transfer activities to farmers and various other parties who have the potential to become farmers' partners (Higher Education) producing institutions and disseminators of innovations in lowland rice farming. These innovations include; superior seed innovation, land management, cropping systems with agricultural mechanization, jajar legowo cropping patterns, biological pest control such as developing the Owl House (RUBUHA) to control rat pests,

3.1.Characteristics of Farmers Rice Farmers

The characteristics of lowland rice farmers who join agricultural extension partnership activities observed in this study include (1) Age, (2) formal education, experience of lowland rice

farming, (4) Number of dependents of the family and (5) Area of land managed for lowland rice. . The description of the average characteristics can be seen in table 2 below:

Table 2 Distribution of Rice Farmer Characteristics

No	Characteristics of Paddy Farmers	Unit	Range		Average
			Low	Tall	
1	Age	Year	26	74	46.32
2	Formal education	Year	0	16	8.84
3	Rice Farming Experience	Year	3	39	18.73
4	Number of Family Dependents	Soul	0	8	3.37
5	Rice field area	hectares (ha)	0.12	1.7	0.38

Table 2 explains the average age of rice farmers in productive age. According to Sofa (2008), the productive working age in developing countries is 18 to 54 years. At the productive age, farmers are generally still easily informed quickly and still have a strong physique to do lowland rice farming. Meanwhile, if farmers are of unproductive age, usually farmers are not able to work optimally in processing their farming.

The average lowland rice farmer has an education level of Junior High School (SL-TP). Basically, a farmer who is highly educated will more quickly adopt innovations and technology, thereby making farmers more dynamic and more efficient in their work. However, low formal education is supported by long average farming experience, the longer the experience, the easier it is for farmers to solve rice farming constraints based on the experience they get.

The average number of dependents in the family is in the moderate category (more than 3 people). The number of dependents greatly affects farming activities, especially lowland rice, this is because members of farmer groups who have a large number of dependents and are of productive age will reduce production costs incurred by farmers. This means that the production costs incurred are less because they have labor in the family, so that with small production costs, they will be able to increase farmers' income. The majority of lowland rice farmers in the research location have a narrow area of land designated for lowland rice business, but some of them have other agricultural land for activities outside of lowland rice cultivation.

3.2.Obstaclesa Application of Innovation to Increase Rice Production

Constraints in implementing innovation include;Low use of superior seeds, availability of fertilizers, garden patterns that are not simultaneous, pest and disease attacks, availability of irrigation water and availability of extension workers

Table 3. Constraints in the Implementation of Rice Rice Innovation in Pidie Jaya Regency

o	Obstacles for implementing innovation in lowland rice cultivation	Index (%)	Interpretation
	Low use of superior seeds	45.32	Less constrained
	Fertilizer availability	89.34	Very constrained
	Asynchronous Cropping Pattern	.47.56	Less constrained
	Pest and Disease Attack	72.37	Constrained

	Availability of irrigation water	40.28	Less Constrained
	Availability of Extension/Assistant Personnel	67.24	Constrained
	Availability of agricultural tools and machines	52.96	Constrained

Source; Primary data analysis. 2021

The table above shows that the availability of fertilizers is in the very constrained category. Based on information from respondents' answers, the majority of farmers who implement innovations submitted by the local government through extension workers and from universities, the ability of farmers to access fertilizers and the availability of subsidized fertilizers are very constraining. This is due to the reduced allocation of subsidized fertilizers for food-growing farmers and the high cost of non-subsidized fertilizers for farmers. In addition to these obstacles, FGD activities also obtained information on the distribution of fertilizers at the appointed distributor level which also often experienced delays so that it was not in accordance with the fertilizer application phase for the growth and development of lowland rice cultivation plants.

Pest and disease attacks are in second place, where the pests that are most complained of are golden snails and rat attacks in several locations that have not implemented the RUBUHA (Owl House) innovation, planthoppers and walang sangit in small quantities. There are interesting findings that the implementation of the RUBUHA innovation, the majority of farmers agreed to greatly assist farmers in controlling rat pests which a few years ago became a significant factor in the loss of production yields.

In the implementation of the FGD with the stakeholders involved in the application of paddy field cultivation innovations in Pidie Jaya Regency, the RUBUHA innovation has become a mainstay innovation because it has been tested and is able to solve the problem of rat attacks in lowland rice cultivation. This is also inseparable from the support of the government through the issuance of a district-level Qanun by including one of the priority activities that can use the Village Fund Allocation (ADG) for RUBUHA innovation activities in villages that have paddy fields for controlling rat pests. So that the number of RUBUHA from the first implementation in 2016 from 4 units in two sub-districts has now been spread over five sub-districts with the number of units now reaching 132 units.

The next obstacle assessed by farmers in implementing innovations in paddy field cultivation is the ratio of the number of extension workers that is not proportional to the size of the working area. During the FGD, this was also discussed where the ratio of one extension worker in several sub-districts had to serve farmers to 3-4 villages. Coupled with the reduction in agricultural extension workers who are entering retirement age. This affects the implementation of innovations that must be accompanied by limited extension workers.

The frequency of extension activities and the presence of extension workers to deliver various innovations and assistance in implementing innovations require sufficient and professional extension resources. The relevant agency has several times conveyed the discrepancy in the ratio of the number of extension workers to the work area but has not been answered with the policy of accepting PNS extension workers or THL extension workers. Another component that has been utilized so far is the existence of independent extension workers who are involved incidentally (when needed) to support the extension program planned and implemented by the agency, the Agricultural Extension Agency (BPP at the sub-district level.

Nextthe availability of agricultural tools and machines to support the application of innovations in cultivation activities ranging from land processing, planting, maintenance and harvesting activities. These constraints are both in terms of quantity and skill in use. In connection with the availability of agricultural tools and machinery, if this applies a simultaneous planting

system to prevent massive pest attacks. Therefore, sufficient agricultural mechanization tools are needed. Constraints due to insufficient availability of land processing and harvesting machines often result in delays in the planting season and harvest implementation.

The factor of availability of irrigation water, simultaneous planting and the use of superior seeds are the three indicators as obstacles in the process of implementing innovations that are perceived by farmers in the less constrained category. this is in line with the support of water resources, infrastructure and good water distribution management. However, a small number of respondents in dry season planting activities complained about the availability of irrigation water to fulfill their paddy fields. In FDG activities, we also get that apart from utilizing irrigation water sources, it is also supported by pumping and technology packages for the use of varieties that are more drought-resistant and also rotational types of food crops on lands that have the potential for drought to occur by planting corn and soybeans.

Simultaneous garden patterns for certain paddy fields have become part of the culture of the local community, which is coordinated by the keujruen blang agency in coordination with extension workers and the sub-district government. The existence of this institution is still deeply rooted in the farming community in the research location. In general, lowland rice farmers in the research location assessed that the Keujruen Blang institution played a role in determining the Simultaneous Garden pattern and implementing the innovations in lowland rice cultivation that they were working on. The role of the keujruen blang institution that has taken root in the farming community in the research location is difficult to replace by government-established institutions such as the P3A (water user farmer association) which applies throughout the archipelago.

The simultaneous tamam system is possible because there are 2 (two) celebrations coordinated by the keujruen blang in one growing season; (1) Kenduri going down the fields (tron u blang) and (2) Kenduri ready for planting (Toeb Blang) but some farmers do it again when it is ready to harvest, but this is not coordinated by the keujruen blang. Based on information from keujruen blang, the implementation of kenduri blang has become a routine that must be carried out, even with self-help preparations and a small amount of funds from member fees. The government (extension) tries to take advantage of the opportunity to share various information related to agricultural development, including planting recommendations simultaneously. This ceremonial activity (down to the rice fields) presents a very high participation of rice farmers.

The next thing that is perceived as less constrained is the use of superior seeds. Based on information from farmers so far, it is very dependent on the seed subsidy program. Some farmers have also started growing awareness of using superior seeds independently. The percentage using informal seeds (seeds from previous harvests) is still relatively high, reaching 47% (almost half of paddy fields farmers). The use of informal seeds will affect the application of the technology package and the potential for non-optimal yields obtained by lowland rice farmers.

3.3.Role Partners in Application of Rice Cultivation Innovations

The roles of the Partners involved in this research include; (1) Local Government Parties, (2) Higher Education Institutions, (3) Entrepreneurs/Private Parties, (4) Farmer Level Institutions. for a picture of the perception of the role of partners in the implementation and smooth running of paddy field cultivation innovations can be seen in the following table;

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Table 4. Value of Partners' Role Index in the Implementation of Lowland Rice Innovation

Innovation characteristics	Index (%)	Interpretation
Regional government	78.36	role
College	56.72	Enough Role
Entrepreneurs	54.63	Enough Role
Farmer Institution	70.66	role
Average	65.09	role

Source: Primary Data analysis, 2021

Table 4 shows that farmers perceive that the local government through the role of extension agents at the Department of Agriculture and Food Crops and Agricultural Extension Centers at the sub-district level play a role in agricultural extension activities in the form of training and mentoring as well as distribution of production facilities to support lowland rice farming activities in the research location. The distributed production facilities that are very beneficial to farmers from the role of local government include; availability of superior seeds, application of cropping patterns, in the application of integrated pest control technology in lowland rice cultivation.

The role of the government which is considered not optimal is in the fertilizer subsidy policy where it is increasingly difficult for farmers to access subsidized fertilizers and its availability is often not timely in accordance with the needs of the rice field cultivation stage. This was also conveyed in the Focus Discussion Group (FGD) where the problem was not absolute from the local government but could originate from the farmer's institution in preparing the RDKK (Definitive Plan for Group Needs) at the farmer group level as well as private parties involved in the distribution of government subsidized fertilizers.

The role of Higher Education (Unsyiah, Unimal and Al-Muslim) is also considered to have quite a role in agricultural activities through Real Work Lectures, Community Service research and research with universities. For a number of activities for implementing innovation in higher education, research staff from students (level, S2 and S1) are assigned to oversee and monitor the implementation of land management innovations, jajar legowo planting patterns, balanced fertilizers, pest control and harvesting farming activities.

The role of universities in the application of innovation is still considered low in frequency (amount) and is unsustainable from the process of introducing innovation to the stage of adopting innovation by lowland rice farmers. In addition, the skills of the higher education community involved in the partnership have not been optimal in mentoring activities to ensure the proper application of innovation by lowland rice farmers.

Regarding the role of the private sector/entrepreneur, farmers perceive that they are quite involved in the category. This is due to the lack of the role of the private sector which is expected by farmers in supporting the availability of business capital and the certainty of the price of the produce that farmers produce. 4500-4900/ Kg of rice harvested by farmers. the private sector is considered not optimal in distributing production facilities; fertilizers, superior seeds and agricultural tools and machines to support the smooth implementation of lowland rice cultivation innovations.

Institutional Farmers carrying out activities at the research location include farmer groups and the Association of Farmers Groups (GAPOKTAN) as well as the traditional institution "Keujruen Blang" which contributes to the implementation of lowland rice innovation activities. Farmers perceive that farmer institutions play a role starting from organizing and regulating farmers and also ensuring equitable availability of irrigation water and the implementation of traditional activities that are still thick in the lives of lowland rice farming communities in Aceh Province. The role of farmer institutions still needs to be strengthened to optimize the role of farmer institutions in supporting farming activities.

In addition to farmer groups, the keujruen blang institution is a customary apparatus in Acehnese society which has the duties and responsibilities to regulate, assist and foster rice

farmers, including farmers' associations using irrigation water. The role of keujruen blang is considered to be quite dominant in empowering farmers, because it carries out tasks such as coordinating mutual cleaning activities, coordinating channel tracing to water sources, distributing water to residents' rice fields, helping coordinate khanduri blang activities, and completing problems that arise between community members relating to disputes over the distribution of water and agricultural land in the fields. In Aceh the role of keujruen blang as a traditional institution is regulated in Aceh Qanun No. 10 of 2008 concerning customary institutions. Meanwhile, regarding his duties, it is regulated in Aceh Governor Regulation (Pergub) No. 45 of 2015.

The results of this study are supported bySwanson, BE, and MM Samy (2002a, 2002b) and Zulvera, et al.(2016) who said the partnership of various parties; the government, NGOs, research institutions and the private sector will be more effective in agricultural extension activities for the process of farmers in adopting the innovations offered.

4.CONCLUSIONS

1. Various innovations applied to rice field cultivation for food security include; superior seed innovation, land management, cropping systems with agricultural mechanization, jajar legowo planting pattern, biological pest control such as developing the Owl House (RUBUHA) to control rat pests, balanced fertilization and implementation of paddy rice harvesting using agricultural tools and machines.
2. Sequentially the obstacles in the application of innovation include;the availability of fertilizers is in the very constrained category, pest and disease attacks, and the availability of extension workers, and the availability of agricultural tools and machinery are in the constrained category and garden patterns are not simultaneously, the availability of irrigation water, and the low use of superior seeds are in the less constrained category.
3. The role of partners perceived by farmers in implementing innovations in lowland rice cultivation; local government and farmers' institutions with interpretation play a role, while universities and private parties/entrepreneurs are in the category of playing a role.

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