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THE INNOVATION OF AGRICULTURAL TECHNOLOGY BASED ON LOCAL WISDOM IN RIANG DUA BOUR RICE FIELD COMMUNITY

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ABSTRACT

The focus of this research is the application of technological innovations based on local wisdom in the Riang Dua Bour rice field community. This study was designed using a survey that is data collection using a questionnaire, and deepened with the Focus Group Discussion (FGD) approach, in-depth interviews, as well as observations of the social, economic, cultural, environmental conditions of the study location, and farming technology used by local farmers. Respondents in the study were 50 people using a simple random sampling. The data that has been collected is analyzed by descriptive statistics. The results showed that farmers prefer to return to technology that is done traditionally based on local wisdom in farming the fields in order to preserve the cultural life of the local community. The form of local innovation technology that is carried out is mutual cooperation in preparing land using man dan women power, besides that farmers prefer to use organic fertilizer with materials originating from the surrounding area by utilizing animal waste and straw residue as natural fertilizer. Farmers do not reject technology but prefer to maintain the values of local wisdom rather than efforts to increase agricultural production using modern technology (chemical fertilizers, agricultural machinery). Technological interventions in the form of the use of agricultural machinery have an impact on saving human labor and large cash costs and minimizing interaction between people in their farming environment. Farmers in carrying out their business are still subsistence not business orientation so optimizing production and income is not the main goal. Regardless of the products and income generated that is important that can meet the needs of the family is the satisfaction of farmers. The productivity and income that is obtained is relatively low if stolen from its production potential. This research recommends the importance of the Government to approach community-based culture before the introduction of technological innovation. The cultural structure of the community that is firmly attached to the community needs to be the main consideration before farming technology engineering.

KEY WORDS

Innovation, paddy farming technology, economic life, farming communities.

Progress and development in any field depends on technological progress, such as the agricultural revolution driven by the invention of machines and new ways in agriculture. The application of agricultural innovation technology plays a role in increasing the productivity of farming, so it has an opportunity to improve the welfare of life, such as increasing the food security of farm households (Fatchiya, A., & Amanah, 2006). Some research in the world related to the application of agricultural innovation technology, are Sunding & Zilberman (2001), Aubert et al (2012), Hermans et al. (2013), Lamprinopoulou et al. (2014), Adnan et al. (2019), Adenle et al. (2019), Pathak et al. (2019), Manda et al. (2020), Wossen et al. (2020), Ali et al. (2020), Chavas & Nauges (2020). The research that has been done aims that the agricultural sector can increase production with the presence of innovation to be a supporting factor in the development of the food industry.

The application of agricultural innovation technology in Indonesia has begun to develop. Innovation is very important because Indonesia is an agrarian country, most of the population of Indonesia depend their life on farming. The agricultural potential that is known is diverse, namely plantations and agriculture. Increasing the community's economy can be seen how important it is to innovate, meanwhile, Indonesia's agriculture sector is never free

from problems each year which always makes farmers difficult. One of the problems of the agricultural sector in Indonesia is agricultural technology.

The concept of innovation with the complexity of existing problems requires innovation thinking from various aspects (Sims, 1997; McCown, 2002; Steiner, 2009; Schut et al., 2015; Douthwaite & Hoffecker, 2017; Sirnawati, 2019; Pennycook & Makoni, 2019; Talukder et al., 2020; Zhang, 2020). Agricultural technological innovations play an important role in increasing agricultural productivity, given that increasing production through land expansion (extensification) is difficult to implement in Indonesia, amidst the widespread conversion of productive agricultural land to non-agriculture. The Central Statistics Agency (BPS) said that the area of paddy fields continues to decline, in 2018, the area of land remains 7.1 million hectares, down compared to 2017 which is still 7.75 million hectares. Transfer of agricultural land functions will certainly have a certain impact on the country, such as the reduction of agricultural land which will certainly have a negative impact on various fields both directly and indirectly, the decline in national food production where national food stability on a large scale will also be difficult to achieve.

Agricultural technology in some regions in Indonesia may still not be suitable to be applied as a whole, considering the geographical, socio-cultural aspects that still adopt traditional farming systems. The concept of a traditional farming system is a unique knowledge belonging to a particular society or culture that has developed for a long time as a result of the process of mutual relations between the community and the environment. This happened to farmers in the Riang Dua Bour Rice Field, Nagawutung District, Lembata Regency. The traditional farming system carried out by Riang Dua Bour farmers is still managed traditionally starting from the use of local seeds, irrigation with rainfed. The gap that occurs in Riang Dua Bour farmers is what drives research to understand farmers' understanding of the application of innovative technology and the impact on agricultural productivity. Adoption of technology by farmers is important in increasing farm productivity. Because farmers as the spearhead of agricultural development plays an important role in increasing the productivity of agricultural products.

METHODS OF RESEARCH

The study was conducted on farmers in the Riang Dua Bour Rice Field, Nagawutung District, Lembata Regency. This study was designed using a survey that is data collection using a questionnaire, and deepened with the Focus Group Discussion (FGD) approach, in-depth interviews, and observations of the social, economic, cultural, environmental conditions of the study location, as well as farming technology used by local farming communities. Respondents in the study were 50 people using a simple random sampling. The data that has been collected is analyzed by descriptive statistics.

RESULTS AND DISCUSSION

Agricultural Conditions in the Riang Dua Bour Rice Fields. Farms in the village of Bour are diverse, namely shifting cultivation, plantations, and rice fields cultivation. The farmers in this village are migratory farmers, who are very slowly changing from shifting agriculture to settled agriculture and/or plantations. The condition of the plantations in this village is neglected. Plantation crops such as cashew, coconut, cocoa, and banana grow without care or attention from the farmers. Bananas grow miserable to form a forest area. Coconut, cashew, and cacao grow to compete in the grove. Plantation crops like these grow to form ecologically valuable forest areas, while the economic value is very low. Bananas that grow to form the forest area when the stems are taken for fodder. Even coconuts that grow to form forest areas do not provide significant economic functions for farmers. Farmers complain that cocoa is easily attacked by pests and diseases, coconuts grow straight and many do not bear fruit, as well as cashew and cocoa. Farmers' complaints like this are difficult to explain, other than environmental conditions that allow plants to grow miserable, and low productivity due to competition for nutrients, sunlight, and other needs. The solution is first and foremost

awareness of farmers to change cropping patterns, such as monoculture of cashew, coconut, cocoa, and also bananas. Farming conditions like this make a low economic contribution to farmers. Based on the physical condition of the residence, it can be concluded that the farmers in this village are on average poor, as a result of not yet implementing a proper farming system.

Agricultural Technology Innovation Based on Local Wisdom in the Village of Bour. The application of innovation to the community in the village of Bour is still local technology. Local Innovation Technology has the value of local wisdom by doing rice farming that is in harmony with nature, meaning that people are more concerned with environmental sustainability than maximizing agricultural production. Technology that is contrary to local wisdom and ignores local values has proven to be poorly developed in this area.

Reflis et al. (2011) suggested that the application of innovation in rural areas of Indonesia is closely related to the government in realizing food self-sufficiency. The role of the food crop sub-sector in the economy is still very important and strategic, this important and strategic role is mainly in terms of increasing production to meet food needs, such as rice. The food security improvement program is directed to meet the food needs of the domestic population from national food production

The government has tried to provide opportunities for farmers to increase agricultural production and efficiency by introducing more efficient technological innovations. For example the intensification system with the use of inorganic fertilizers (chemicals) that can damage the ecosystem, the use of agricultural machinery that saves labor such as rice thresher tools, ani-ani, soil processing machinery and so forth. All of these technologies apparently did not develop in the village of Bour. Because the farming community considers that the technology can reduce friendship, emotional ties and family values between communities, because mutual cooperation is maintained the values of togetherness in the local cultural environment.

Mayadewi (2011) also suggested that agricultural technology in rice farming such as the green revolution has a significant role in increasing the productivity of rice cultivated by farmers. In agricultural modernization there is a change in farm management from traditional to more advanced agriculture with the use of new technologies. Modernization can be interpreted as a transformation that is change. Modernization in agriculture in Indonesia is marked by fundamental changes in agricultural patterns, from traditional ways to more advanced ways.

Unlike the people in the village of Bour, farmers prefer to return to technology that is done traditionally and maintain local wisdom in farming the fields in order to preserve the cultural life of the local community. The form of local innovation technology that is carried out is mutual cooperation in preparing land using human labor, doing crop rotation. Farmers prefer to use organic fertilizer by utilizing animal waste and residual jerapi as natural fertilizer. Farmer's view if chemical fertilizer is used once will continue to depend because the soil will lose fertility and the soil becomes damaged. Pesticides are considered to destroy predators and living things that are beneficial to plants. The use of agricultural machinery is contrary to the values of community cooperation because agricultural machinery limits the use of human labor. Working together in a farming activity is the happiest for the farming community.

So that farmers do not reject technology but prefer to maintain the values of local wisdom rather than efforts to increase agricultural production using modern technology (chemical fertilizers, agricultural machinery).

Paddy and Horticultural Farming. Paddy fields covering an area of 12.5 hectares from 50 hectares of the target are distributed to each farmer with an area of 0.25 hectares per person. Land area of 12.5 is controlled by 50 farmers who are cultivators. If 50 hectares of paddy fields are planted twice each year so that productivity reaches 4 tons per hectare, then the Rieng Dua paddy field will contribute 400 tons of milled rice; significant volume to reduce the volume of rice imports to Lembata District.

The 12.5 hectares of paddy fields cultivated by farmers since 1985 are divided into Block I and Block II. Block I with an area of 7.5 hectares is a swamp block, Block II with an area of 5 hectares is a dry block. This 12.5 hectare paddy farmland has a slope to the west.

The area in the west (Block I) is slightly sunken so that the water that comes to this place is inundated, or difficult to dry according to the language of the farmers. Block I is planted with rice 2-3 times a year. Block II is planted with rice once a year, but it is also used for horticultural farming, even though it has been done intensively since 1998 but with minimal technology.

Farm income. Analysis of Farmers' farm income in the Riang Dua paddy fields is shown in Table.1. Ideally, every agricultural business is oriented to efforts to obtain adequate production and income. Income other than to finance the input issued, the results are for consumption and are sold to obtain cash to maintain the continuity of the farm. But the results of empirical observations of business planning and implementation were not done well, because the orientation of the business was only to meet family consumption (subsistence). Farmers never counted or recorded how much the use of production factors and the number of agricultural product produced. Regardless of the production and income obtained is not a problem for farmers who are most important even though food needs are limited.

If analyzed the use of production inputs other than their own land, the use of seeds from the results of the supply from the previous planting season, the use of labor in tillage and weeding is done in mutual cooperation (working together in family ties). The work of mutual assistance is not paid but the landowner must bear the cost of consumption during work. Generally the costs incurred are quite large because there is waste.

The results of farm income analysis are based on land blocks. Block I is planted three times a year, Block II is planted twice a year and Block III is once a year. The classification of land blocks is based on the condition of irrigation water availability. Where Block I has the potential for the availability of water available throughout the season so that the entire rice crop is cultivated. Block II, medium water availability and Bolok III, water availability is very less so it is dependent on rain. Cost and income calculation results as in table 1.

Table 1 – Inputs and Outputs of Paddy Rice Farming in the Riang Dua Bour Rice Field

Number	Description	Planting Season 2018		
		I (Rp)	II (RP)	III (Rp)
Harvest 3 times a year (Block I)				
	Output	22.500.000	22.500.000	22.500.000
	Input	21.900.000	21.900.000	21.900.000
	Income	600.000	600.000	600.000
Harvest 2 times a year (Block II)				
	Output	45.000.000	45.000.000	
	Input	45.300.000	43.800.000	
	Income	-300.000	600.000	
Harvest Once a year (Block III)				
	Output	22.500.000		
	Input	22.650.000		
	Income	-100.000		

Table 1 shows that the real income obtained from each block of land is relatively very small and even shows a minus calculation in block II and III. Because in this block the use of labor is relatively high while the yield of production is relatively very low. The entire Block I is planted with rice three times a year. Block II is planted with rice twice a year, and Block III is planted with rice only once a year, during the rainy season. During the dry season Block II and III are planted with horticulture (chili, tomatoes, water spinach, eggplant and mustard greens), by applying a very simple technology, which only relies on labor, seeds from their own crops, and organic fertilizer from crop residues and animal waste.

The results of the calculation of income are very low because all costs including family donations for farming are calculated, the costs incurred are artificial costs (Shadow costs). So that farming is economically not feasible if all costs are taken into account, but (Krova, et al 2019) farmers continue to maintain their business because it is a way of life and part of maintaining their survival. Food dependence of farmers only on these simple farms.

Nendissa et al (2019), in study reports that farmers in NTT in carrying out their business always receive low incomes that are close to or even do not exceed production costs. Although the income received by farmers from the sale of products is low, (Roy, et al 2019) farmers remain in their business because of the work carried out from generation to generation to support the household economy. Farming has been considered as a way of life to meet the socio-cultural demands of the people of NTT (Nendissa, et al. 2018a; Nendissa, et al 2019b).

CONCLUSION

The condition of rice farming in the Riang Dua paddy fields is still very far from the performance of the advanced farming system. Rice fields have not been used optimally, with major constraints on their own human resources and land rights (cultural constraints). The application of innovation in the Riang Dua Bour rice field community is still locally and naturally, where local innovation technology has the value of local wisdom by conducting rice farming in harmony with nature. The form of local innovation technology that is carried out is mutual cooperation in preparing land using man and woman power besides that farmers prefer to use organic fertilizer by utilizing animal waste and straw residue as natural fertilizer. Farming is very subsistence so that farmers' production and income do not have to be taken into account.

The role of the government is important in policy interventions and assistance to change the orientation of subsistence farmers. A cultural approach based on local wisdom becomes the basis for success in the transfer of agricultural technology, or in the process of the adoption of agricultural innovation.

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