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Identification Of Factors That Cause The Adoption Of Agricultural Innovations Resulting From University Research By Farmer Groups (Study Of Agricultural Research Results From Andalas University)

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Abstract. This study aims to: describe the adoption of agricultural innovations, and identify factors that cause the adoption of agricultural innovations resulting from research from Andalas University. This study was designed using a qualitative approach and a case study method. The research data was analyzed qualitatively. The study was conducted in various districts of Padang City, which have been Andalas University's research partners over the last ten years. The results of the study indicate that the adoption of agricultural innovations resulting from university research by the agricultural community was still far from satisfactory. This was indicated by the decision of most beneficiaries of innovation to implement unsustainable innovations and some did not implement innovations. The identified factors influencing this unsustainable adoption were the low intensity of assistance to the community targeted by the research results, the poor perception of the community towards the nature of the innovation introduced, the leadership of farmer groups and agricultural extension methods. To increase the adoption of agricultural innovations among the recipient community of agricultural innovations, it is recommended that universities collaborate with agricultural extension institutions in providing assistance, producing innovations by considering the characteristics of innovations, namely; relative advantage, complexity, compatibility, and observability as well as extension methods that are learning by doing

Keywords: agricultural innovation, adoption, research, universities

I. INTRODUCTION

Indonesian higher education in agriculture faces increasingly difficult challenges. The existence of higher education is a major national asset and has a strategic role in efforts to improve the quality of life and competitiveness of the nation. The era of globalization in all aspects of life places higher education in agriculture as the spearhead of the development of agricultural technology to support national food security. Higher education is an innovation hub that plays a role in the progress of society, providing impacts and solutions from the results of research conducted. Therefore, the results of research from higher education need to be attempted using information downstreaming methods so that the community can feel the immediate impact [1]. The results of innovation from higher education that increase the added value of industry can be achieved if higher education is closer to the dynamics of socio-economic activities of the business world or interacts openly and encourages reciprocal productive processes [2].

The process of spreading innovation in the midst of society is called innovation diffusion, and the implementation of innovation by beneficiary individuals is called adoption. Empirical facts show that innovations that spread in the midst of society

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are not always immediately adopted, but it takes time and goes through certain stages. The process that innovation goes through until it is adopted by an individual is called [3] with the process of innovation adoption. Research on the process of diffusion and adoption of agricultural innovations, especially innovations produced through research in universities, is important to do because it will answer the question of whether the research results produced by universities are accepted by society and applied correctly and sustainably. Become evaluation material in compiling research policies by higher education institutions/universities. Universities have the potential to produce applied research that can provide added value to today's industry and become a major player in technology development. The problem of transferring innovation from academics to industry is a critical component of today's national and worldwide issues.

Fauzi in [1] stated that universities have produced extensive research, but the results of the research have not been widely diseminated by the community. Andalas University (Unand) is one of the universities that is productive in producing innovation through research conducted by lecturers. The results of research related to agricultural innovation are one of those that have been widely disseminated to the main actors in society (farmers and farmer groups). This study aims to describe the adoption of agricultural innovations, and identify factors that cause the adoption of agricultural innovations resulting from research from Andalas University.

II. RESEARCH METHOD

This study employs a qualitative approach with a case study method. The types of data collected are primary data and secondary data. Primary data consists of data related to the topic of research data obtained directly from research respondents. Meanwhile, secondary data refers to supporting data in the form of documents from related institutions and agencies. Data collection in this study was carried out by means of document studies, field observations, in-depth interviews. The research instrument is in the form of an interview guide.

The research informants were administrators and members of farmer groups who were beneficiaries of agricultural innovation from the results of Andalas University research, totaling 10 farmer groups spread across the districts of Koto Tangah, Pauh and Kuranji, in the city of Padang, and Canduang, Agam. Informants were selected based on group members participating in agricultural innovation dissemination activities by Andalas University lecturers.

III. RESULTS AND DISCUSSION

This research focussed on Farmer groups and Community groups who were beneficiaries of the results of agricultural innovation research, consisting of Farmer groups, Women Farmer groups and one Community group. The Informant Data was gathered based on information from researchers and based on secondary data obtained from literature studies. Table 1 presents the data on beneficiaries who became the informants of the research.

Table 1. Data of Research Informant

No	Farmers Group Name	Location (District)	Type of Innovation
1	Sekayan	Koto Tangah	Pest Control
2	Banda langik	Koto tangah	Rice cultivation using System of Rice Intensification
3	Woman Farmers Group of Banda Langik	Koto Tangah	Fertilization
4	Sungkai permai	Pauh	Shallot Cultivation Fertilization Agarwood Processing
5	Woman Farmers Group of Melati Mini	Pauh	Fertilization Poultry Feed Pest Control

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6	Tani Sejahtera	Pauh	Mushroom Cultivation Fertilization
7	Woman Farmers Group of Keti Tabiang mandiri	Pauh	Mushroom Cultivation / Inoculation Online Product Marketing
8	Kami saiyo	Kuranji	Fertilization
9	Tani sepakat	Canduang	Vegetable cultivation Pest control Fertilization
10	Community Group	Pauh	Ornamental Plant Cultivation

The sources of information from each group are derived from the administrators and members of the beneficiary group, who are considered to familiar with the innovations received by the group concerned.

Overview of the adoption of agricultural innovations resulting from Andalas University research

Based on the results of the research conducted, the adoption of agricultural innovations by beneficiaries consists of:

a. Sustainable adoption.
Sustainable adoption is an innovation that has been adopted by beneficiaries since its inception and continues to be used as of the time of this research. The study's findings revealed that just about 20% of innovations had been continually accepted until the time the research was done.

b. Non-sustainable adoption.
Non-sustainable adoption is a condition where adopters adopt an agricultural innovation from the inception, then stop adopting it after applying it several times in their farming business. Research results show that 40% of adoptions are unsustainable.

c. Not adopting.
Beneficiaries who are in the position of deciding not to adopt are those who have never implemented the agricultural innovation that was introduced from the start. The number of beneficiaries who do not adopt is equal the number of beneficiaries who adopt and do not continue, around 40 percent

Identify factors that cause the adoption of agricultural innovations resulting from research from Andalas University

The following factors have been identified as influencing the adoption of agricultural innovations as a result of university research: beneficiaries' perceptions of the qualities of innovation, the characteristics of beneficiaries , farmer group leadership, and sustainable assistance. Table 3. Shows the distribution of factors identified as influencing the adoption of agricultural innovations.

Table 3. Identification of factors influencing the adoption of agricultural innovations resulting from university research

Informant	Influential Factors	Category
1	No Practice of Innovation The results of innovation cannot be seen in real terms No assistance	Extension Method Intensity of Mentoring Characteristics of Innovation
2	Complicated Unavailability of Raw materials There are other jobs besides farming Change of group leader	Characteristics of Innovation Characteristics of Innovation Adopter characteristics Leadership in farmer groups
3		Characteristics of innovation

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	Complicated	Characteristics of innovation
	Takes time	Characteristics of innovation
	Unavailability of raw materials	Farmer characteristics
	There are other jobs besides farming	
4		Characteristics of innovation
	Climate and soil do not support	Characteristics of innovation
	Complicated and takes extra time	
5	Unavailability of raw materials	Characteristics of Innovation
	Takes a long time	Characteristics of Innovation
	The impact on plant growth is slower than the old method.	Characteristics of Innovation
		Characteristics of Innovation
	The cost of production facilities is expensive	Characteristics of Innovation
	The selling price is not comparable to the cost of implementing innovation	Characteristics of Adopter
6	Often fails in trying innovation	Innovation Characteristics
	Difficult	Innovation Characteristics
	Takes time	Innovation Characteristics
		Adopter Characteristics
7	Difficulty in getting optimal results	Characteristics of innovation
	Often fail in trying innovation	Characteristics of adopters
	Not skilled in implementing innovation	Characteristics of adopters
	Lack of mentoring	Intensity of mentoring
8	Unavailability of Raw materials around the farmland	Characteristics of innovation
		Characteristics of innovation
	Difficult to obtain raw materials	Characteristics of innovation
	Takes time	Characteristics of innovation
	Farming is not the primary job	Intensity of Mentoring
	Lack of assistance	
9	Farming is the primary occupation	Adopter characteristics
	Sustainable mentoring	Intensity of mentoring
	Group leadership	Group leadership
	Awareness of the benefits of low-chemical products	
10	Farming is not the primary job	Adopter characteristics
	Time constraints	Adopter characteristics

The results of the study in Table 3 show that the factors that cause the low adoption of agricultural innovations resulting from university research are:

1. Characteristics of Innovation

The characteristics of innovation are measured from the adopter's perception of the innovation introduced. The results of the study show that the characteristics of innovation that influence the adoption of innovation are:

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a. Relative adventitious,
That is, the characteristics of innovation are assessed based on the level of relative economic benefits compared to the methods that have been applied by the adopter. The aspects assessed are more time spent, the results obtained are not too different, the cost of implementing the innovation is not comparable to the results obtained.

b. Complexity
Complexity refers to how the adopter perceives the complexity of innovation in comparison to previous techniques.The results of the study show that beneficiaries have difficulty finding raw materials to implement innovations, such as materials for making organic fertilizers and botanical pesticides.

c. Compatibility
Compatibilty is the adopter's perception of the suitability of the introduced innovation with their resources. The results of the study showed that some of the introduced innovations were not in accordance with the conditions of the farmers' land, as stated by the beneficiaries of the red onion innovation. The innovation was not adopted because it was not in accordance with the adopter's land. The same thing also happened to the mushroom nursery innovation, because the nursery environment that did not comply with the nursery requirements caused the failure of the innovation, which ended with the termination of the adoption of the innovation by the adopter.
The suitability of the innovation with the adopter's primary work also influenced the adoption of agricultural innovations. Adopters whose main job was not farming stated that the availability of time was a factor causing them not to adopt the innovation

d. Observability
Is the adopter's perception of the observability of the results of the introduced innovation. The results of the study showed that the adopter's perception of this observability aspect was quite low. Innovations that are considered low in observability are mainly related to natural pesticide innovations and organic fertilization. The results of this study are in line with the results of research by [4] , [5] showing that innovation characteristics have a significant effect on the level of technology adoption.

2. Characteristics of innovation recipients/adopters.

According to [3] an individual's knowledge of innovation is determined by their qualities and social structures. Individual variables identified as impacting innovation adoption in this study include motivation and primary income derived from non-farming work. The findings of this study are consistent with the research of [6], who found that farmer characteristics influence farmers' understanding of innovation. Knowledge about innovation is the initial stage in the innovation adoption process.

3. Group leadership

According to [5], four elements influence the innovative decision-making process in relation to the social system: social structure, system norms, the role of leaders, and change agents. Informants from the Banda Langik Farmer Group described the role of the farmer group leader in executing the SRI rice growing innovation in the study's findings. The function of the farmer group's leader in persuading members to use the SRI method on their farm land, however with the change of group leader, adoption of SRI rice innovation in this group has also ceased. The findings of this study are consistent with [5] research, which suggests that the head of the farmer group plays a role in providing information, having planning and carrying out supervision.

4. Extension Method

The extension method in this study is the method used by the source of innovation in this case researchers from universities in conveying agricultural innovations to farmers. Farmers felt that lecture method alone is ineffective in encouraging farmers to adopt innovations, but must be accompanied by direct practice. For example, in the aspect of cultivation and natural pest control, farmers expect there to be direct practice on farm land related to the innovation, so that members of the farmer group are confident and willing to apply the innovation on their respective lands. The results of this study are

supported by the research of [7] which shows that extension methods and extension media together have an influence on the adoption of lowland rice cultivation.

IV. CONCLUSION

The results of this study on the adoption of agricultural innovations from university research show that the level of adoption of agricultural innovations by beneficiaries of innovation is relatively low. This is indicated by the innovation decisions of most adopters is to adopt but not to continue while others do not adopt.

The identified factors that influence the adoption of agricultural innovations resulting from research by universities are the adopter's perception of the characteristics of the innovation, which include relative advantage, complexity, compatibility, and observability. The next influencing factors are the characteristics of the adopter, the intensity of assistance/extension and group leadership. Based on the research results, it is recommended that universities provide intensive assistance to the beneficiaries of the innovation, producing innovations by paying attention to the characteristics of the innovation, namely; relative advantage, complexity, compatibility, and observability as well as extension methods that are learning by doing.

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