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Factors Influencing the Adoption of the Organic Vegetable Farming System in Agam and Tanah Datar Districts of West Sumatra

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Abstract

This study aims to analyze the level of adoption of the organic vegetable farming system and to analyze the factors that affect the level of adoption of the organic vegetable farming system. The study was conducted in Agam and Tanah Datar districts of West Sumatra. The sample of study consists of 300 farmers who attended development programs of organic vegetable areas in West Sumatra. Data analysis was performed using the descriptive statistical analysis and the structural equation models (SEM). The results showed that the level of adoption of the organic vegetable farming system in Tanah Datar and Agam districts is the low category. Factors that affect the level of adoption of the organic vegetable farming system consist of support of external environment, the nature of innovations of the organic vegetables farming system, extension support and the behavior of farmers reflected by the knowledge, attitudes and skills of farmers in organic farming.

Keywords: adoption; organic vegetable farming system.

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1. Introduction

Sustainability is becoming a very important issue to be considered in the development of agriculture across the region nowadays. World of agriculture received sharp criticism because agricultural activities that have been carried loaded with the use of chemical inputs in relatively high amounts, so that it have resulted in the destruction of natural environment and ecology. This has led to calls for the world of agriculture to be sustainable and not exploitative, which means that agriculture must be done in the ways that are environmentally friendly, utilizing natural resources and inputs that are available as well as possible [11].

One of the agricultural systems that is the implementation of a system of sustainable agriculture is the organic farming system. The organic farming is a holistic production system that avoids the use of synthetic fertilizers, pesticides and genetically modified organisms, thus minimizing the deleterious effects on the environment [8].

Some researches indicate that by applying the organic farming system, farmers will get benefit, such as reducing production costs, get a higher price than conventional products, increase revenues, avoiding dependence from the input dealers and improve economic sustainability and also improve the health of farmers and their families. [4,16,14]. An organic farming system has grown rapidly in the countries of Europe and America. The rate of sales of organic food in these countries is about from 20-25% per year over the past decade [1].

The Indonesian government supports the trend of the organic agriculture by issuing a policy called Go Organic 2010, which aims to foster, facilitate, guide and regulate the development of organic farming. Various attempts have been made to socialize the organic farming system for farmers, but based on various surveys and observations in the field, it turns out that the organic farming has developed slowly in the farming community. The slow development was followed by decreasing of the organic farming area in Indonesia in 2010 until 2012. Based on data from the organic farming statistics of Indonesia 2012, the total area of organic farming land in Indonesia in 2010 was 238,872.24 ha but in 2012 that was 213,023.55 ha. This means that the land area decreased about 10% [2]. In West Sumatra, as one of the pilot areas of organic farming in Indonesia, it is also show the slow development of organic agriculture among farmers [5].

The problems of this study are: (1) how is the rate of adoption of the organic vegetable farming system by vegetable farmers, (2) what are factors that influence the rate of adoption of organic vegetable farming system by such vegetable farmers. Based on these problems, this research aims to: (1) analyze the level of adoption of the organic vegetable farming systems and farmer empowerment, (2) analyze the determinants that affect the level of adoption of the organic vegetable farming system by farmers.

This study refers to the following: the innovation diffusion theory proposed by Rogers [13], the concepts of innovation communication by Leeuwis [11], the approach of behavior, cognitive, learning theory by Klausmeir and his colleagues [10], and some research results relating to the adoption of innovation and behavioral change. Several variables which are allegedly able to explain the reasons that cause farmers to adopt or not organic farming innovations are as follows: changes in knowledge, attitudes and skills of farmers as a result of learning process gained farmers, farmers' perceptions toward the characteristics of organic agriculture innovation, and

factors of external environmental support.

2. Research and Methodology

This study uses a quantitative research paradigm with a survey method. The study location was determined by purposive study. Determination of sample research was conducted by multi-stage random sampling. The study location is in Agam and Tanah Datar districts of West Sumatra. From the two districts are selected sub-districts which are regional development of organic vegetables, and from each sub-district were randomly drawn sample. The study population is vegetable farmers who had attended the program development of the organic vegetables area at the study site in 2008 until 2012. Amount study population is 541 farmers, consisting of 303 and 238 farmers in Agam and Tanah Datar districts respectively. The sample is set 300 people in order to comply with the rules for using statistical analysis SEM (structural equation model). The sample consists of 168 farmers in Agam and 132 farmers in Tanah Datar. Determination of sample is proportionally, based on the number of population in each study site.

Primary data was collected by interviews using questionnaires and direct observations in the field, while the secondary data obtained from the Department of Agriculture and Horticulture, Organic Certification Agency in West Sumatra, Central Bureau of Statistics, Hall extension Agriculture, Fisheries, Forestry and Food Security in each sub-district that includes the location of the study. Data analysis was performed using descriptive statistics and inferential statistics, namely analysis of multivariate equations with SEM analysis using Lisrel program 8.30.

3. Results and Discussion

Adoption level of the organic vegetable farming systems.

Adoption of the organic vegetable farming system is reflected by the following indicators: intensity of adoption, level of using of local resources, level of adaptation and sustainability of innovations adoption in the organic vegetables farming.

The intensity of adoption of the organic vegetable farming system is measured by the level of technology implementation of the organic vegetable farming system, which consists of the use of organic seeds, organic fertilizer, pest control and diseases organically, organic weed control, tillage and irrigation organically.

The results showed that the level of adoption of the organic farming system by farmers is in the low category.

The low adoption intensity is characterized by the use of the means of production that still contain chemical elements, such as chemical fertilizers, chemical pest exterminator and controllers, as well as the production process which is carried out by the farmers is not appropriate with the rules of organic farming which is set by the Organic Certification Agency of West Sumatra. The mean scores of the level of adoption of the organic farming system are presented in Table 1.

Table 1: The mean scores of the level of adoption of the organic vegetable farming system

Variables / indicators	Measure-ments	Mean		
		Agam	T. Datar	Total
The level of adoption of the organic farming system				
The intensity of adoption	Skor[a]	38.55	43.86	41.21
The level of use of local resources	Skor[a]	30.75	31.14	30.95
The level of adaptation	Skor[a]	38.05	38.99	38.52
The level of sustainability of innovations adoption	Skor[a]	63.68	52.60	58.14

[a]Score: 0 -25=very low, 26-50=low, 51-75=medium, 76-100=high

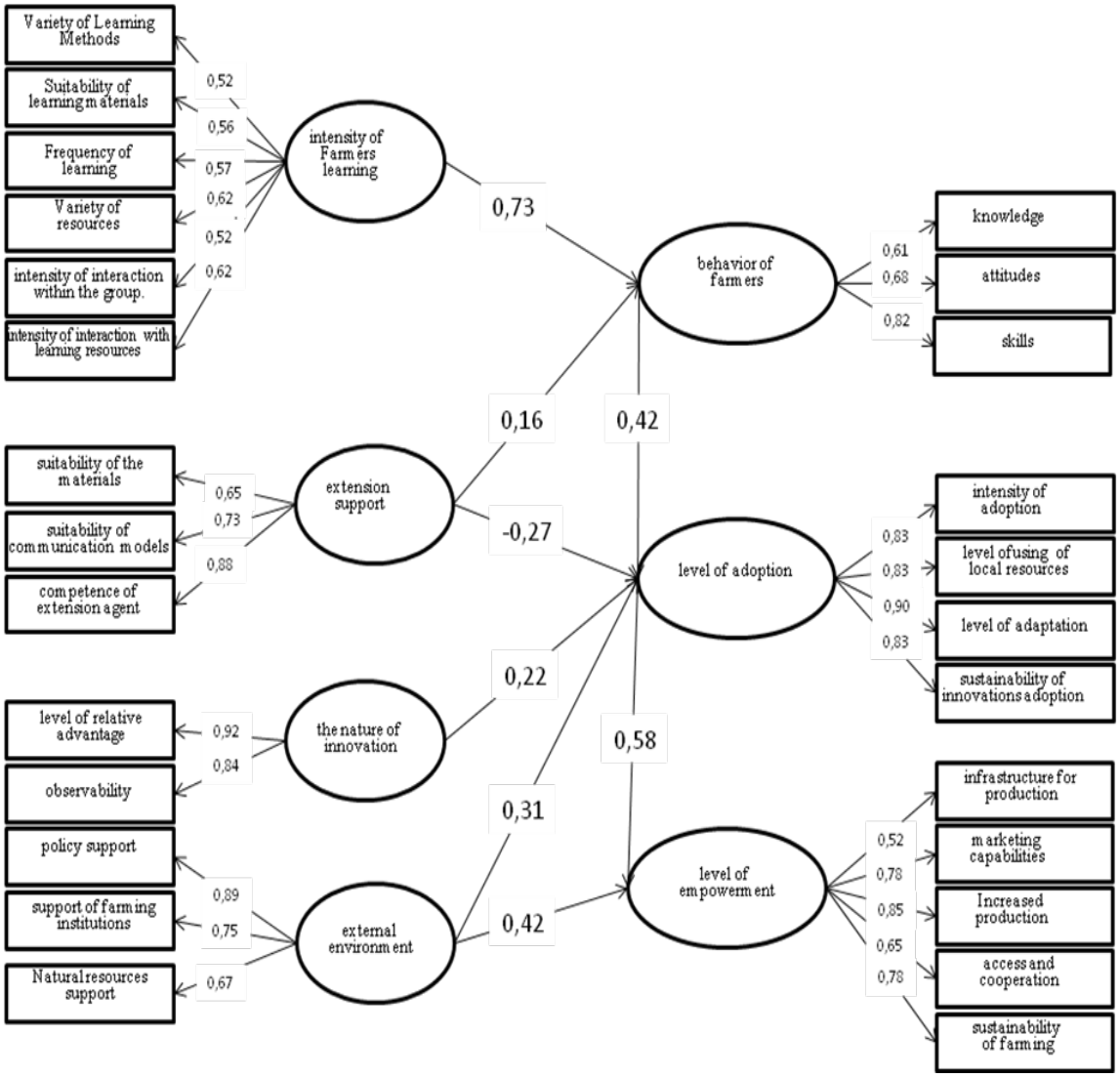
The level of use of local resources with the average score of 30.95 is in the low category. The level of use of local resources is a fundamental principle of the organic vegetable farming system developed by the government of West Sumatra. To meet the means of production, farmers are encouraged to produce their own, such as organic fertilizer, nutrients for plants, botanical pesticides, weed control, and vegetable seeds. But if seeds cannot be produced by the farmers self, they may buy from kiosks, but it must be treated to eliminate the chemical elements contained in the seeds. All production facilities which are used in the process should be clear origins. The level of adaptation is a principle of the organic farming expected for being applied by the farmers. Each technology received by farmers, should be adapted to the local environment, by means of adaptation of technology, thus plant growth becomes the better. The result of this study showed that the level of technological adaptation of the organic vegetable farming system by farmers is in the low category. Sustainability of adoption of the organic farming system is expected conditions after farmers applying the organic vegetable farming system on their land. The results showed that the level of sustainability of adoption of the organic vegetable farming system is in medium category.

Factors influencing the adoption of organic vegetable farming systems

A result of SEM analysis, and test of fit of the model, it is obtained a fit structural model in the shape of a cross diagram as shown in Figure 1. The figure shows that the variables that directly influence to the level of adoption of the organic vegetable farming system is as follows: behavior of farmers related to the organic vegetable farming system, support external environment, the nature of innovation and extension support. A variable that indirectly influence on the level of adoption of the organic vegetable farming system is the intensity of farmers learning. The indicators of behavior of farmers that influence significantly positively on the level of adoption of the organic farming system are as follows: knowledge of farmers about the organic vegetable farming system, attitudes of farmers towards the organic vegetable farming system and skills of farmers in the technique of the organic vegetable farming system. Farmers who have the high knowledge about the organic farming system, and the positive attitude towards the organic farming system, and also have the skill in practicing of the organic farming techniques will improve the level of adoption of the organic vegetable farming system. In [17] it is

obtained that the level of skills of farmers in the organic vegetable farming system in Tanah Datar and Agam districts is in the low category. The low level of skills of farmers in the organic vegetable farming system is one of factors that influence the low of adoption level of the organic vegetable farming system by farmers. Support of environment reflected by variables such as policy support, the availability of institutions associated with farming, and natural resources support, gives a positive significant effect on The availability of government policies related to the organic farming, and it run in accordance with provisions, will improve the adoption of the organic vegetable farming among farmers. So is the case with the availability of institutions that support the organic farming, ranging from upstream to downstream, which includes institute of the infrastructure for production, capital institutions, marketing, information and learning institutions that can be accessed by farmers are part of the factors that affect the sustainability of the adoption of the organic farming system by farmers, in line with the results of Karki and his colleagues [9] and Ismail and his colleagues [7]. Arpaphan & Ganesh [3] in their research showed that the organic certification process that is difficult is one of constraint factors in improving the adoption of the organic farming.the level of adoption of the organic farming system. The nature of innovation is the next factor that contributes to the adoption level of the organic vegetable farming system. The nature of adoption is measured by, such as, the perception of farmers on the relative advantage of innovation, the level of easiness of innovation tested on a small scale, level of concordance of innovation, the complexity of innovation, and level of observability of innovation by farmers and others. The results showed that the level of relative advantage and observability of innovation of the organic vegetable farming system affect significantly positively on the level of adoption of the organic vegetable farming system. Relative advantages of the vegetable farming system that are perceived low by farmers include as follows; the amount of time and effort spent for the organic farming is higher than that of the non-organic farming system, the production of organic farming at the beginning of the use is perceived lower than the production of the non-organic farming system, and the absence of the price difference between organic and non-organic products when sold to traditional markets. Low level of observability of organic farming innovation is related to; the high risk of pests attack on vegetable crops, the slow process of controlling pests and diseases in the organic vegetable farming system, as well as the slow growth of plants when grown organically. Influence of farmers' perceptions about the nature of innovation toward the level of adoption of organic farming was also expressed in a research by Ismail and his colleagues [7]. Agricultural extension support is one of the variables that take effect on the level of adoption of the organic vegetable farming system. The results of SEM analysis showed that agricultural extension has a positive influence on the behavior aspects of farmers which includes; knowledge, attitudes and skills in the organic farming system, however agricultural extension has a negative influence on the level of adoption of the organic farming system. This is presumably because the organic agricultural extension intensively is only at certain periods when there is an organic vegetable development program. After the program is completed, the agricultural extension is not intensive and sustainable more. Although an organic farming program still exists in a location, but a group of farmers who will be given an agricultural extension intensively by an agricultural agent is a new organic group again. The organic extension activity which is not sustainable is described by farmers "as if they were released when they are unable for walking by their self", which result that they do not continue the knowledge and skills gained for being applied in farming lands. The effect of extension on adoption by farmers is in line with the results of research conducted by Eunice & Cynthia [6] and Poolsawas & Napasintuwong [12]. The analysis results of SEM test show that there is a relationship

between the level of adoption of the organic vegetable farming system and the level of empowerment of vegetable farmers. The adoption level of the organic vegetable farming system that is reflected by the intensity of adoption, the level of use of local resources, the level of technology adaptation of the organic vegetable farming as well as the level of adoption sustainability of the organic vegetable farming system affects significantly and positively the level of empowerment of vegetable farmers. Referring to the results of SEM analysis on previous research purposes (Figure 1), it can be said that the adoption of the organic vegetable farming system sustainably by farmers and supported by the external environment will be able to improve vegetable farmers empowerment, in line with a research by Beban [4] who studies on the agriculture organic which can be a development strategy that empower.



RMSEA=0,054, GFI=0,97, AGFI=0,95, CFI=0,98, NFI=0,96

Figure 1: Structural model

Based on the analysis of statistical tests to variables of research that affect the level of adoption of the organic vegetable farming system, we can improve the adoption of the organic vegetable farming system, through the

following steps: (1) improvement of the intensity of farmers' learning through the establishment and facilitation of learning institutions for farmers (farmer to farmer), (2) improvement of extension support through the implementation of sustainable extension, process-oriented, and improvement of the competence of extension agent by organic farming trainings, (3) improve the support of external environment; through the formulation of government policies that pro-organic farming, there exists a system of strict control on the field against implementing policies or rules relating to organic farming, facilitating farmers with access to markets, information, and certification, (4) improve the nature of innovation by conducting research with farmers associated with the organic farming technology, so that the process of organic farming and organic agricultural products produced by farmers can be felt better than the non-organic agricultural products.

4. Conclusion

The adoption level of the organic vegetables farming system in Agam and Tanah Datar districts are in the low category, which is reflected by the following indicators: the intensity of adoption, the level of use of local resources, and the level of technological adaptation the organic vegetable farming system that is low. Factors influencing the adoption of the organic vegetable farming system are: (1) behaviour of farmers which is reflected by the level of knowledge, attitudes and skills of farmers in the organic farming (2) support of the external environment, which is reflected by support of policies, support of farming institutions, support of social systems and support of natural resources, (3) the attributes of innovation consists of a level of relative advantage and the level of observability of innovation of the organic vegetable farming system, (4) support of the agricultural extension.

5. Recommendations

To face the challenges and demands of the world of agriculture currently and future, the enhancement of adoption of organic vegetable farming systems among farmers is important to do, in order to the farmers can compete and take part in free trade. The enhancement of adoption of organic vegetable farming systems requires strong cooperation between farmers, the government, research institutions and policy makers.

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