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(RESEARCH ARTICLE)

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Farmers' perceptions of organic farming innovation attributes in Batur village, Getasan district, Semarang regency, Indonesia

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Abstract

The Organic Farming Village (DPO) Program is one of the Semarang Regency government's efforts to realize sustainable agriculture. The program takes the form of counseling and providing organic agricultural production facilities, which, among others, were given to four farmer groups that cultivate vegetables, namely Tranggulasi, Bangkit Merbabu, Minang Bangkit Merbabu, and Karya Muda Bangkit Merbabu in Batur Village, Getasan District, Semarang Regency. Perception and participation are essential aspects of the success of the (OFV) program. This research aims to determine the level of farmers' perceptions regarding the attributes of organic agricultural innovation. This research used a quantitative descriptive method with descriptive statistic technique for 46 organic farmer respondents who were determined using proportional random sampling. The research results show that the level of perception of innovation attributes, including relative advantage, suitability, complexity, testability, and observability of the results, is considered very high with percentage values of 85%, 84%, 82%, 87%, and 79%;

Keywords: Innovation attributes; Organic farming; Perception; Vegetables; Indonesia

1. Introduction

Organic farming is an agricultural concept that needs to be developed widely globally. Organic farming is still considered to take a long time, and proving agricultural productivity is difficult in a short time. Even though the productivity of land that implements organic farming will increase, production costs will be lower, and commodity prices can be competitive in the market. Even though it takes two years to convert the land, production costs will be lower (Hadi et al., 2019). According to Reganold and Wachter (2016), a blend of organic and other innovative farming systems is needed. However, significant barriers exist to adopting these systems, and a diversity of policy instruments will be required to facilitate their development and implementation.

One of the factors in realizing sustainable agriculture that significantly influences the success of an organic system is farmers. The level of farmer knowledge about sustainable agricultural systems is closely related to farmer perceptions. Farmers need an increasingly positive perception of the program. The more positively a person perceives the program, the easier it is for farmers to agree to participate. Farmers' perceptions of positive programs can positively impact land management, improve farmer skills, increase job vacancies, and increase the income of farmers and other village communities.

Getasan District in Semarang Regency, Central Java, is a district that has implemented the Organic Farming Village (DPO) program since 2019, with the main commodity being vegetables. One of the villages in Getasan District with quite extensive application of organic farming is Batur Village, with four farmer groups that have implemented organic farming, namely Tranggulasi, Bangkit Merbabu, Minang Bangkit Merbabu, and Karya Muda Bangkit Merbabu. The DPO

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program is implemented based on a program related to organic farming, designed in 2010 by the Ministry of Agriculture titled "Go Organic." Currently, organic farming continues to be pursued by the Ministry of Agriculture through its objectives in the Ministry of Agriculture's Strategic Plan for 2020-2024, namely a target of 5% increase in organic food in 2020 and 20% in 2024.

The successful implementation of organic farming systems in Batur Village must be distinct from the participation of farmers as subjects in agricultural activities. The program will be successful if the community participates directly. Farmer participation in the program is influenced by the program's design and farmers' perceptions of the program to be implemented (Azwar, 2016).

According to Rogers (1983), the adoption of innovation, especially at the persuasion stage, is influenced by the characteristics of the innovation, including relative advantage, suitability, complexity, testability, and observable results. Therefore, it is necessary to research the relationship between Farmer Characteristics and Perceptions of Innovation Attributes with Farmer Participation in the Organic Farming Village Program in Batur Village, Getasan District, for better program sustainability. To determine the level of perception of farmers' innovation attributes in the Organic Farming Village program in Batur Village, Getasan District.

2. Materials and Methods

The research was carried out in Batur Village, Getasan District, Semarang Regency, in 4 farmer groups that were facilitated by the Organic Farming Village Program and had implemented organic farming. The research was carried out from January to March 2024.

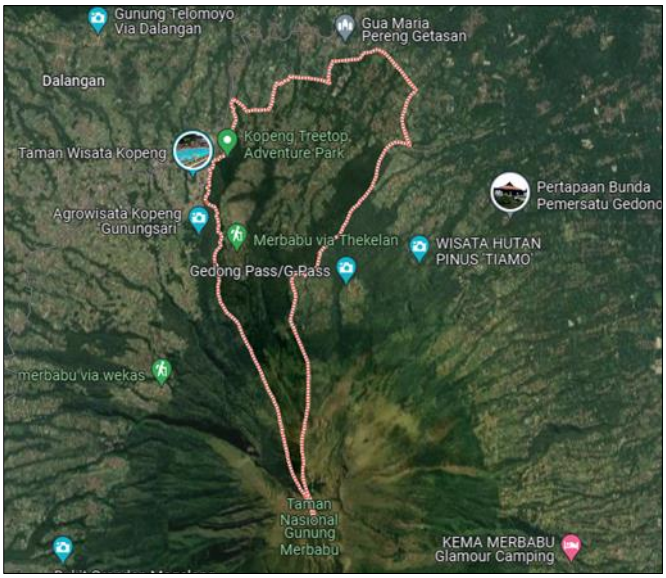

Figure 1 Batur Village Batur village is on the slopes of Mount Merbabu

The number of samples taken from the population is determined using the Slovin formula. According to Riduwan & Akadon (2010) the Slovin formula is used if the population is known, the following is the Slovin formula to determine the sample size:

$$n = N/(N.d^2+1)$$

n = Number of sample members
N = Total Population
d^2 = Precision (precision set at 10%)

So the calculation is:

$$n = N/(N.d^2+1) = 86/(86.〚(0,1)〛^2+1) = 86/1,86 = 48,45 = 46 \text{ person}$$

The variable measurement technique used to measure the level of perception and participation uses Sugiyono's (2011) Likert scale score tabulation formula.

$$\text{Perception level} = (\text{Total questionnaire score})/(\text{Maximum questionnaire score}) \times 100\%$$

The score interpretation criteria for the level of perception and level of farmer participation in the DPO program can be categorized as follows:

0% - 25% = The perception level is very low
26% - 50% = The perception level is low
51% - 75% = The perception level is high
76% - 100% = The perception level is very high

3. Results and Discussion

3.1. Farmers Characteristics

The respondents' characteristics in this research include age, gender, years of education, land area, and farming experience. The characteristics of farmers of organic farming in this research as shown in Table 1.

Table 1 Number and Percentage of Respondent Characteristics

Respondent Characteristics	**Total (People)**	**Percentage (%)**
Age:		
30-40 years old	8	17
41-50 years old	9	20
51-60 years old	18	39
61-70 years old	9	20
71-80 years old	2	4
Total	46	100
Gender		
Man	39	85
Woman	7	15
Total	46	100
Level of Education		
Elementary school	24	52
Junior high school	15	33
Senior high school	6	13
Bachelor	1	2
Total	46	100
Land Area		
400-919 m^2	15	33
920-1439 m^2	10	22
1440- 1959 m^2	10	22
1960- 2479 m^2	7	15

2480-3000 m^2	4	9
Total	46	100
Farming Experience		
13-27 years	9	20
28-42 years	25	54
43-56 years	12	26
Total	46	100

This research shows that farmer respondents tend to be young and productive but have low education and limited land ownership. Research by Nelson et al. (2019) found that most organic farming farmers were under 50 years old, had a high school education, and had a land area of less than 1 hectare. Lapple & Rensburg's research (2011) states that early adopters of organic farming are the youngest group.

3.2. Innovation Attributes

3.2.1. Relative Advantage

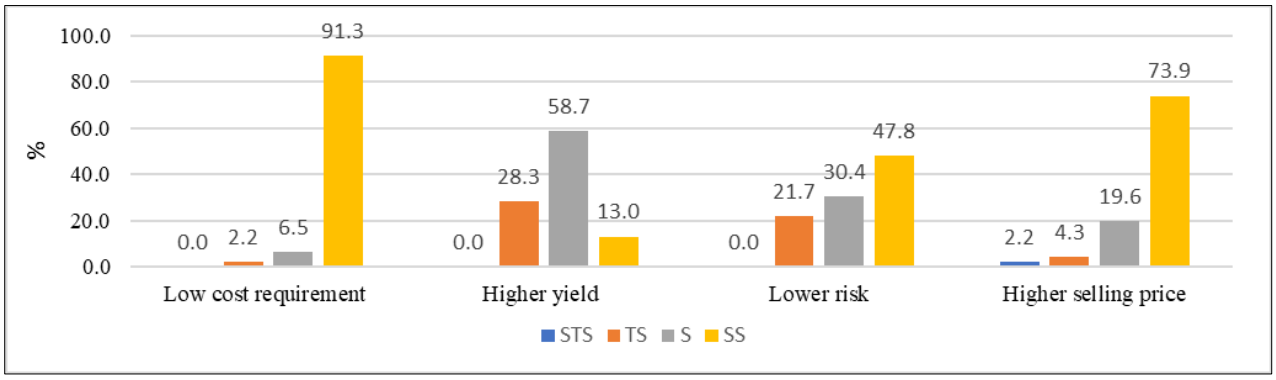

Figure 2 Relative Advantage Attributes Perceptions

As shown in Figure 2, farmers feel that after adopting organic farming, the costs are lower because they do not need to buy pesticides and chemical fertilizers, which are expensive and require around two to three applications in one planting season. Buying natural ingredients for pesticides and fertilizers costs much less. Most farmers' yields are high because the land used is accustomed to organic farming and is without dependence on chemicals. Meanwhile, some farmers' yields are low because they are still trying the correct methods to control pests, while farmers with proper control feel that their yields are higher. This is the same as the risk in organic farming because, with low costs, the risk of poor harvest results is reduced compared to conventional farming. According to Alawode & Abegunde (2015) on organic farming in the Oyo region of Nigeria, the costs used for organic fertilizers and pesticides are much cheaper than conventional ones and the selling price obtained from vegetable crops is higher for organic farming.

3.2.2. Compatibility

Figure 3 shows that cultivating organically does not violate specific hereditary rules and is by local culture. Organic cultivation also preserves the environment with no chemical residues on the land because it uses natural ingredients. Most respondents' choice regarding organic cultivation experience was not because they had personal experience but because they gained knowledge through farmer groups and the Organic Farming Village program. Several farmers started organic farming before the program existed. Porciuncula et al. (2015) stated that farmers in Central Luzon in the Philippines carried out organic cultivation based on something other than prior experience with organic farming. There are many new things to learn from land preparation, pest control, and nutrient management. Alawode and Abegunde (2015) state that organic farming includes applying methods that aim to obtain optimal harvest results without damaging the natural environment or the people who live and work around it. Organic farming operates in harmony with nature, not against it.

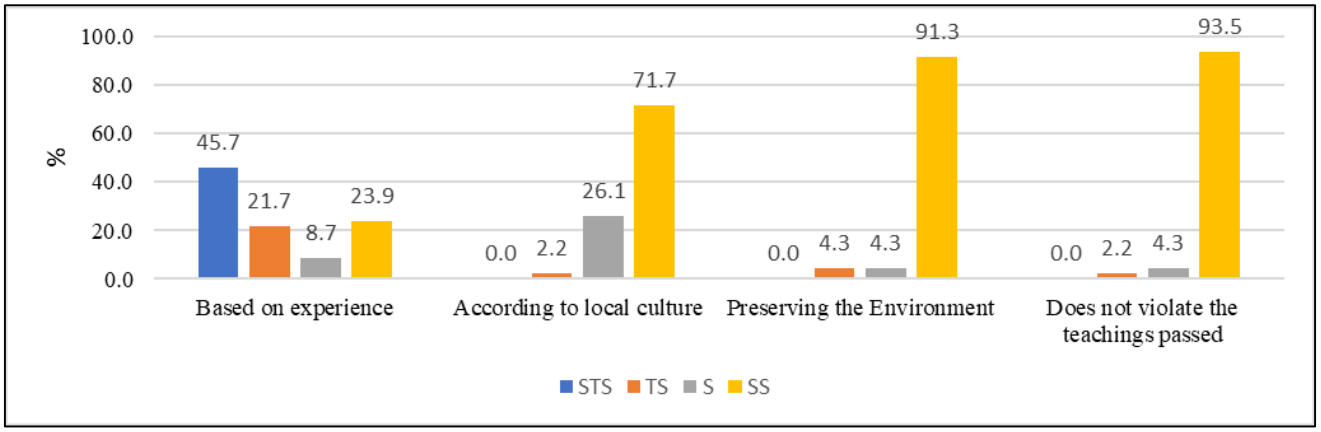

Figure 3 Compatibility Attributes Perceptions

3.2.3. Complexity

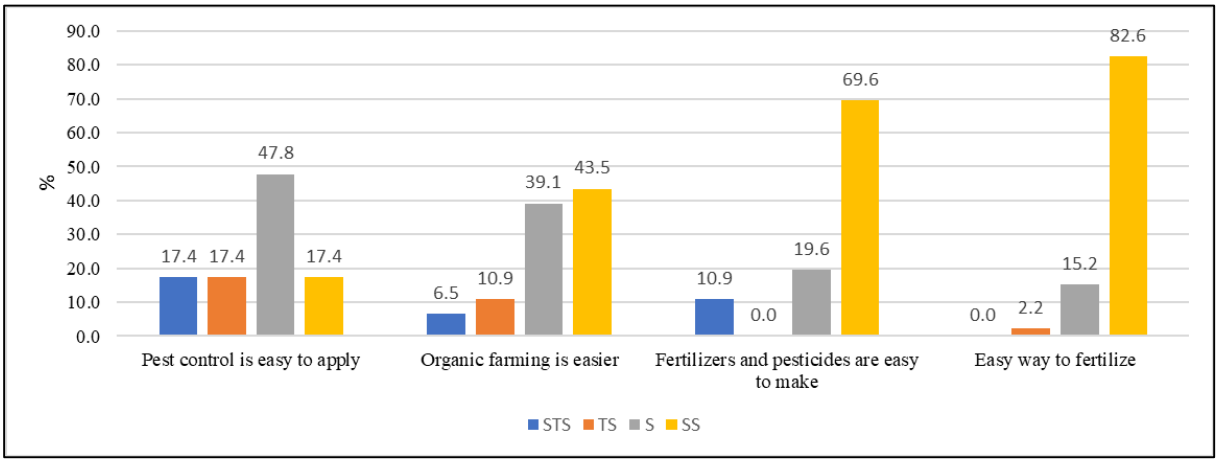

Figure 4 Complexity Attributes Perceptions

Farmers gain knowledge regarding cultivation and marketing methods through the DPO program and gain marketing channels as well. Respondents also gained networks with farmer groups or other agencies to enrich their knowledge regarding organic cultivation. Farmers can also access input assistance from manure and vegetable pesticides through the DPO program. The histogram shows that the respondents got results at this participation stage. However, some farmers need marketing and networking access. Production facilities are only available to a few farmers. Generally, farmers who do not receive these facilities are farmers from the Minang Bangkit Merbabu farmer group. According toMuneret et al. (2018), pest control in organic farming is easier because of the help of natural predators. If chemical pesticides are used, there is a possibility that natural predators will die. Reasonable pest control can occur when the plants are still two weeks old. According to Giri & Pokhrel (2022), organic farming uses natural fertilizers such as compost and green manure and simpler vegetable pesticides and biopesticides. This process can reduce dependence on synthetic chemicals, which may require special handling and high costs.

3.2.4. Trialability

According to farmers, organic farming can be applied to various types of land that are large or narrow, less fertile, former uses of inorganic farming, and others. According to most respondents, all farmers can try organic farming. Several farmer respondents felt that farmers who were still hesitant about trying organic farming would have difficulties and tend to be unsuccessful in organic farming because they would struggle with low yields in the first few years. Organic farming can increase the organic matter content in the soil, improve soil structure, and increase the capacity of soil pores (Assogbadjo et al., 2012). Farmers use animal waste, food waste, and crop residue to make fertilizer. According to Chew et al. (2019), fertilizer can use materials around farmers, such as animal waste, sewage sludge, municipal solid waste, and food waste, to be converted into organic fertilizer. This process reduces waste while improving soil quality by adding high levels of organic matter and essential nutrients.

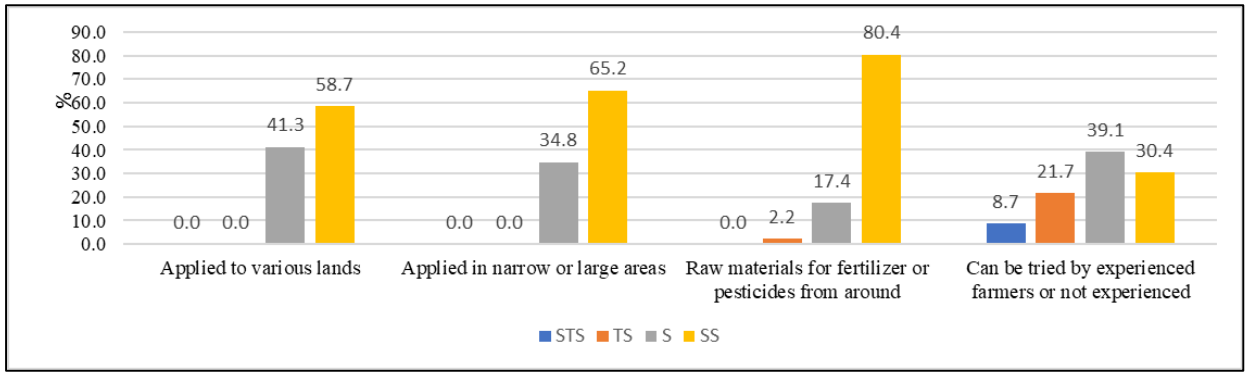

Figure 5 Triallability Attributes Perceptions

3.2.5. Observability

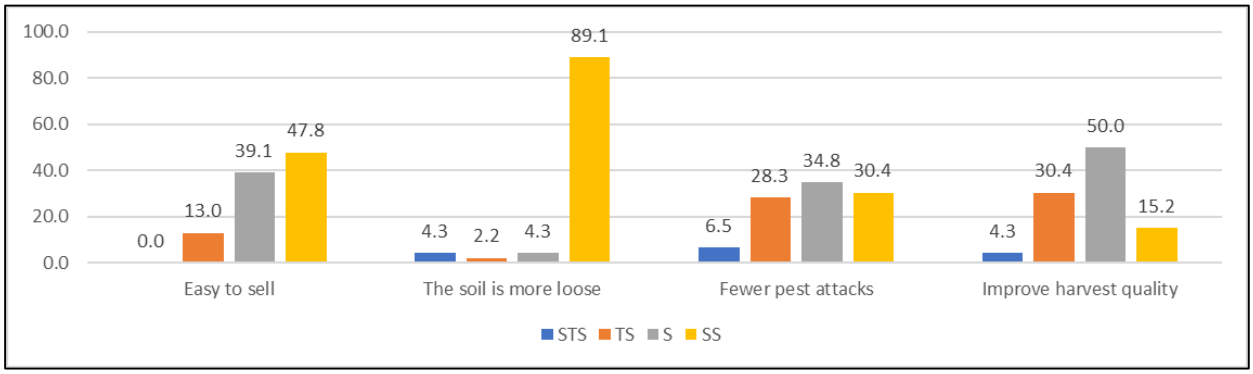

Figure 6 Observability Attributes Perceptions

Respondents felt that organically cultivated products were more accessible to sell because many people were interested in them; the land used also became looser after organic cultivation was implemented than conventional cultivation, and the quality of the harvest was also better with vegetables that were fresher and slightly larger, and attacks there are fewer pests. Some farmers feel that pest attacks are the same as conventional ones because pest control is still incorrect in the application timing, so the pests are already in the adult phase and have become resistant. Giri & Pokhrel (2022) state that conventional cultivation can produce slightly more than organic cultivation. However, organic farming increases soil biodiversity, reduces uniformity, and changes the composition of soil microbiota compared to conventionally managed soil. Smith et al. (2019) explained that organically cultivated plants tend to have better taste and a longer shelf life. Without the use of synthetic chemicals and with particular attention to soil health, these plants can develop more robust natural defense mechanisms and improve organoleptic qualities such as taste, color, and aroma.

3.3. Level of Farmer Perceptions on Organic Farming Innovation Attribute

Tabel 1 Results of Level of Farmer Perceptions on Organic Farming Innovation Attribute

Innovation Attributes	Total Respondent Score	Total Maximum Score	Percentage	Innovation Attributes Level
Relative Advantage	628	736	85%	Very High
Compatibility	625	736	84%	Very High
Complexity	601	736	82%	Very High
Trialability	641	736	87%	Very High
Observability	588	736	79%	Very High

Based on Table 2, the innovation attributes of relative advantage, suitability, complexity, testability, and observable results are classified as very high. Organic farming is profitable with lower farming costs because fertilizers and pesticides are made from materials around the land in higher quantities and selling prices because they are labeled organic. Regarding suitability, organic farming is also based on local culture and preserves the environment with no chemical residues on the land because it uses natural ingredients. Respondents' experience cultivating organic is not due to personal experience but to gaining knowledge through farmer groups and the Organic Farming Village program.

The use of fewer chemicals makes organic cultivation easier because it only requires more straightforward ingredients without mixing several types of chemicals that are risky for plants. Vegetable fertilizers and pesticides are easy for farmers to make because they understand how to combine and fertilize them. Extension workers provide many new things that support farmers' farming businesses so that farmers have a good perception of the five innovation attributes.

4. Conclusion

The innovation attribute, namely relative advantage, is included in the very high category with a percentage of 85%, the suitability innovation attribute is included in the very high category with a percentage of 84%, the complexity innovation attribute is included in the very high category with a percentage of 82%, the innovation attribute can be tested, including into the very high category with a percentage of 87%, and the results of the innovation attribute that can be observed are included in the very high category with a percentage of 79%.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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