

# Adoption of New Farming Technology as an Effort for Creating Food Security and Development of Barns in Rural

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## ABSTRACT

The study about adoption of new farming technology as an effort for creating food security and development of barns in rural, conducted in three places, they are in 1) Gempol Village, Karanganom Sub-district, Klaten Regency, 2) Pendowoharjo Village, Sewon sub-district, Bantul Regency, and 3) Canden Village, Jetis sub-district, Bantul Regency. This study aims to: 1) Assess the level of motivation of farmers in the application of organic agriculture as an effort to food security, 2) Determine the level of adoption in the *jajar legowo* rice planting system, 3) Find out several factors influence farmers' perceptions of barns. The research used a descriptive method with a quantitative approach. Random sampling was conducted in the Special Region of Yogyakarta and the census in Central Java. The research used proportion tests and multiple linear regression analysis to determine the motivation, adoption, and perception of new agricultural technology as an effort to create food security and development of barns in rural areas. Based on the research that has been done, it is known that 1) The motivation level of organic rice farmers in Karanganom sub-district, Klaten Regency is high with a percentage of 88.10%, 2) More than 50% of farmers in Pendowoharjo Village, Sewon sub-district, Bantul Regency have high adoption rates for creating food security with using the technology of high *jajar legowo* rice planting system, which is 81.73%, 3) The factor that influences farmers' perceptions of barns in the Canden sub-district Jetis sub-district Bantul Regency most, is the activeness of the management and the benefits of the barns on the level of food security of farmers with the Adjust R value is 0.475.

**Keywords:** Adoption, Motivation, Perception, Food Security, Barns

## 1. INTRODUCTION

Agriculture is an essential sector of a country by maintaining the economy by increasing national income and welfare. Indonesia has abundant natural resources that potential in the agricultural sector. Although from 2016 to 2019, the rice consumption of Indonesian people decreased every year, the demand for rice as a staple food remained high. In addition, rice is a common agricultural commodity for farmers in Indonesia. Therefore, rice is an essential and strategic commodity in Indonesia.

Today Indonesian government has begun its mission to become a self-sufficient food country and become a world food producer by becoming the world's food barn

in 2045. Many preparations are needed by the Indonesian government, starting from maintaining existing agricultural land so that land conversion does not occur, providing new expansion areas, and applying advanced technological discoveries for intensification [1].

Implementing an excellent agricultural system is expected to have a positive impact so that the future and the environment are maintained so that the order of life is getting better. Organic agriculture with plant cultivation activities using natural ingredients is an effort to apply sustainable farming systems. The example is innovation of the *jajar legowo* planting system. This innovation expected to be implemented by most farmers in Indonesia because it is one of the efforts for food security and

sustainable agricultural development to improve people's welfare. According to research by Rofatin and Rakhima [2], the average farm production with a 2:1 row legowo system is 4.66 quintals while productivity is 28.29 Kw/0.17Ha/MT. This research was conducted with the objectives: 1) assess the level of farmers' motivation in the application of organic agriculture as an effort to creating food security. 2) determine the level of technology adoption of the *jajar legowo* rice planting system. 3) find out several factors that influence farmers' perceptions of barns.

## 2. RESREACH METHOD

This study used a survey method, that is multi-stage random sampling. This study is based on the results of research conducted in three places, there are: 1) Gempol Village, Karanganom Sub-district, Klaten Regency, 2) Pendowoharjo Village, Sewon sub-district, Bantul Regency, and 3) Canden Village, Jetis sub-district, Bantul Regency. Quantitative research aims to test existing theories and influence factors and scientific explanations related to phenomena or conditions found in the field after the research. We took the data by interview using questionnaires.

## 3. RESREACH LOCATION OVERVIEW

### 3.1. Karanganom sub-district, Klaten Regency

The area used for this study is Gempol Village, Karanganom sub-district. It has 154.62 Ha with coordinates 110,61805 East Longitude / -7.624545 South Latitude, consisting of 11 villages.



**Figure 1.** Gampol Village Area Map

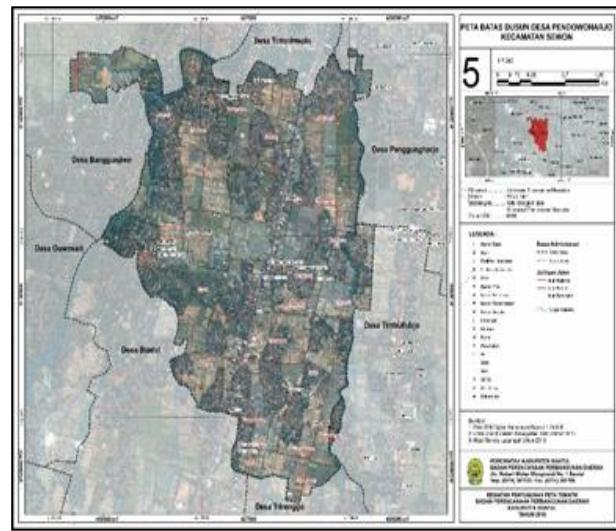
Source : Gampol Village Monograph Data

The Gempol Village area is used for settlement and rice fields for agricultural activities and other land-use types. In detail, the land use in Gempol Village consists of rice fields with an area of 98.7 hectares, fields or fields of 0.35 hectares, settlements covering an area of 6.8 hectares, a yard area of 22.5 hectares, village treasury

lands covering an area of 22.95 hectares, and public facilities with an area of 2.41 ha. The area of paddy fields is 98.27 hectares, with a percentage of 64.11% of the total area of Gempol Village.

### 3.2. Pendowoharjo Village Sewon Sub-Distric Bantul Regency

Pendowoharjo Village is one of the villages in Sewon sub-district, Bantul Regency. It has 698.0170 Ha with coordinates 110°20'17" east longitude to 7°51'46" south latitude, consisting of 16 Villages.



**Figure 2.** Pendowoharjo Village Map

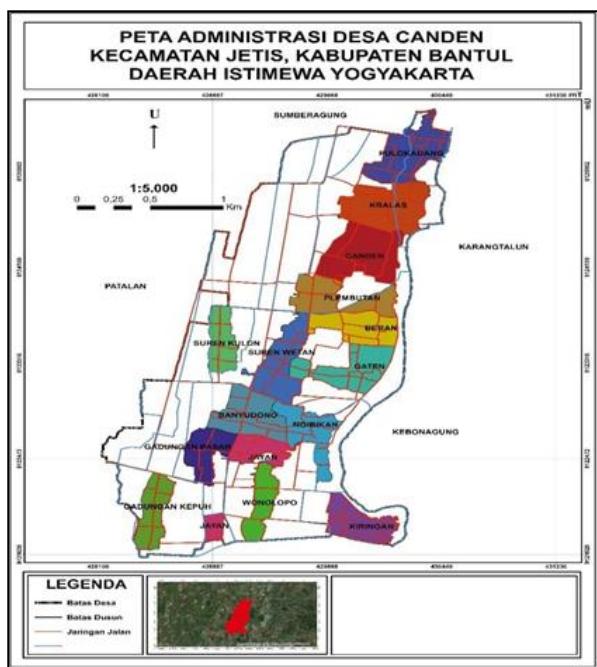
Source: Pendowoharjo Village Monograph Data

The Pendowoharjo Village is a lowland area, so it is very suitable for agriculture. According to the Pendowoharjo Village Monograph Data (2020) regarding land use, most of the land in Pendowoharjo Village is rice fields of 336.230 ha with a percentage of 48.17% of the total land use.

### 3.3. Canden Village, Jetis sub-district, Bantul Regency

Canden Village has an area of 5,631 km<sup>2</sup> consisting of 15 villages. The Canden Village is also directly adjacent to the following areas:

- |       |   |
|-------|---|
| North | : Sumber Agung Village, Jetis sub-district  |
| South | : Sri Hardono Village, Pundong sub-district |
| East  | : Kebon Agung Village, Imogiri sub-district |
| West  | : Patalan Village, Jetis sub-district       |



**Figure 3.** Administrative Map of Canden Village

Source: Canden Village Monograph Data

## 4. RESULTS

### 4.1. Farmers' Motivation in the Application of Organic Agriculture as an Effort for Creating Food Security in Karanganom sub-district, Klaten Regency

This study is conducted with the assumption that the higher the motivation of farmers in implementing organic farming, the higher the efforts of farmers in optimizing yields. The ERG theory of motivation proposed by Alderfer serves as a guide in this study, which states that motivation is divided into three needs: existence, relatedness, and growth.

The motivation of farmers in the application of organic agriculture as an effort to food security in Karanganom sub-district is based on the three motivational needs divided into five categories, which is very not interested, with a percentage of 0-20%, not interested, with the percentage of 21-40%, in doubt, with a percentage 41 – 60%, interested, with percentages around 61 – 80%, and very interested, with the percentage of 81 – 100%. This is a reference in showing the level of motivation of farmers in applying organic agriculture. The motivation of farmers in applying organic agriculture as an effort to food security in Karanganom sub-district is as follows.

**Table 4.1.** Farmers Motivation in Applying Organic Agriculture in Karanganom sub-district in 2021.

No.	Indicator	Score Interval	Average Score	Freq. (%)	Category
1	Existence	0-30	26,11	87,03	Very Interested
2	Relatedness	0-40	34,97	87,43	Very Interested
3	Growth	0-25	22,46	89,85	Very Interested
	<b>Average</b>	<b>0-95</b>	<b>27,85</b>	<b>88,10</b>	Very Interested

Source: Primary Data Analysis, 2021

Furthermore, the data on the distribution of farmers' motivation in applying organic agriculture as an effort to food security in Karanganom sub-district are as follows.

**Table 4.2.** Distribution of Farmers' Motivation in applying the Organic Agriculture in Karanganom sub-district in 2021.

No.	Category (Score)	Total Person	Percentage (%)
1.	Very not Interested (0-19)	0	0
2.	Not Interested (19,1-38,1)	0	0
3.	Adequately Interested (38,2-57,2)	0	0
4.	Interested (57,3-76,3)	4	10,81
5.	Very Interested (76,4-95)	33	89,19
	<b>Total</b>	<b>37</b>	<b>100</b>

Source: Primary Data Analysis, 2021

Based on table 4.2, it is known that the data on the distribution of farmers' motivation in the application of organic agriculture as an effort to food security in Karanganom sub-district has a majority percentage of 89.19%, is included in the very wanted category. It can be concluded that farmers applying organic agriculture to food security in Karanganom sub-district have relatively high motivation, because the awareness of farmers to implementing organic farming is relatively high. Moreover, based on the categorization of the level of motivation, it can be used to perform an analysis of the proportion test to test the first hypothesis. The following explanation is proofing first proportion test:

#### a. Hypothesis Formulation

Ho: It is estimated that less than 50% of farmers have high motivation to implement organic agriculture for food security.

**Ha:** It is estimated that more than or equal to 50% of farmers have high motivation to implement organic agriculture for food security.

#### b. Formulation of Statistical Hypothesis

**Ho:**  $P < 50\%$

**Ha:**  $P \geq 50\%$

#### c. Testing Criteria

Zvalue  $\geq$  Z table: H0 approved, Ha rejected

Zvalue  $<$  Z table: H0 approved, Ha rejected

Significance level: 5%.

#### d. Statistical Testing

$$\begin{aligned} Z \text{ value} &= \frac{\frac{37}{37} - 0,65}{\sqrt{\frac{0,65(1-0,65)}{37}}} \\ &= \frac{1-0,65}{\sqrt{0,00615}} \\ &= \frac{0,35}{0,078} \\ &= 4,487 \end{aligned}$$

Based on the hypothesis proportion test results, the calculated Z value of the study is 4.487 with the Z table value of 1.645. In this study, the value of Z count  $Z_\alpha$  then Ho is rejected, and Ha is accepted. This shows that more than or equal to 50% of farmers have high motivation to implement organic agriculture to create food security in Karanganom sub-district.

### 4.2. Adoption of Jajar Legowo Planting System Technology in Pendowoharjo Village, Sewon sub-district, Bantul Regency

Adoption is a process of changing behavior that is consist of knowledge, attitudes, and skills. It happens in a person after receiving an innovation or new technology. The level of adoption can be classified based on the scoring of the implementation of the *jajar legowo* rice planting system which includes planting rows, planting techniques, applying fertilizers, and controlling weeds, pests and diseases. Farmer's adoption in this study was classified into five categories, namely always (81-100), often (61-80), sometimes (41-60), rarely (21-40), and never (0-20). The adoption of *jajar legowo* rice planting technology in Pendowoharjo Village, Sewon sub-district is presented in table 4.3 below.

**Table 4.3.** Adoption of *Jajar Legowo* Rice Planting System Technology in Pendowoharjo Village, Sewon sub-district in 2021.

No.	Indicator	Score Interval	Average Score	Freq. (%)	Category
1.	Plant Row	0-14	11,91	85,33	Always
2.	Planting	0-20	16,31	81,50	Always
3.	Fertilization	0-8	7,00	87,50	Always
4.	Weed, Pest and Disease Control	0-21	14,76	72,59	Always
	<b>Average</b>	<b>0-63</b>	<b>49,98</b>	<b>81,73</b>	<b>Always</b>

Source: Primary Data Analysis, 2021

Furthermore, the distribution of the level of technology adoption of the *jajar legowo* rice planting system by farmers is as follows.

**Table 4.4.** Distribution of the Adoption Rate of *Jajar Legowo* Rice Planting System Technology by Farmers in Pendowoharjo Village

No.	Adoption Category	Score	Total (Person)	Percentage (%)
1.	Low	0 – 31,5	0	0
2.	High	31,6 – 63,1	40	100
	<b>Total</b>		<b>40</b>	<b>100</b>

Source: Primary Data Analysis, 2021

Based on Table 4.4, 100% of farmers in the Pendowoharjo Village have a high level of adoption in the *jajar legowo* rice planting system. After that, based on the categorization of the adoption rate, it can be used to the proportion test to analyze the first hypothesis. The following is the proof of the first hypothesis using the proportion test.

#### a. Hypothesis Formulation

**Ho :** It is estimated that less than or equal to 50% of farmers have a high technology adoption of the *Jajar Legowo* rice planting system.

**Ha :** It is estimated that more than 50% of farmers have a high level of technology adoption of the *Jajar Legowo* rice planting system.

#### b. Statistical Hypothesis Formulation

**Ho :**  $P \leq 50\%$

**Ha :**  $P > 50\%$

#### c. Testing Criteria

**Zvalue  $\geq$  Z table :** **H0 approved, Ha rejected**

**Zvalue  $<$  Z table :** **H0 approved, Ha rejected**

**Significance level :** **5%.**

#### d. Test Statistics

$$Z \text{ value} = \frac{\frac{x}{n} - Po}{\sqrt{\frac{Po(1-Po)}{n}}}$$

$$Z \text{ value} = \frac{\frac{40}{40} - 0,5}{\sqrt{\frac{0,5(1-0,5)}{40}}}$$

$$Z \text{ value} = \frac{1-0,5}{\sqrt{0,00625}}$$

$$Z \text{ value} = 6,329$$

Based on the results of the proportion test above, it was found that the calculated Z value in this study was 6.329 with a Z table value of 1.645. The test results show that H0 rejected, and Ha accepted. This means that more than 50% of farmers in the Pendowoharjo Village, Sewon sub-district, Bantul Regency have a high level of adoption in the *jajar legowo* rice planting system.

### **4.3. Farmers' Perceptions of Community Food Barns in Canden sub-district Jetis Village, Bantul Regency**

In this study, the factors that influence farmers' perceptions are divided into internal and external factors. Internal factors that are thought to influence farmers' perceptions include the experience of farmers in participating in food barn activities and the need to fulfil farmers' daily consumption by supplying food barns. Meanwhile, external factors are the distance between their place of residence and the food barn, the activeness of the food barn management, and the benefits of the food barn on the level of food security of farmers.

#### *4.3.1. Farmers Experience Participating in Food Barn Activities*

The experience of farmers in participating in activities related to barns is all forms of knowledge that have been obtained from the results of participating farmers after participating in activities related to barns. In this study, the experience of farmers was grouped into five categories, namely: never (0-20%), rarely (21-40%), sometimes (41-60%), often (61-80%), always (81-100%). The distribution of farmers based on the experience of farmers with food barns can be seen in the following table.

**Table 4.5.** Distribution of Farmers according to Farmers' Experiences in Participating in Food Barn Activities in Canden Village in 2021

No.	Category (score)	Total (Person)	Percentage (%)
1.	Never (0-7,6)	9	22,5
2.	Rarely (7,7-15,3)	2	5,0
3.	sometimes (15,4-23,2)	1	30,0
4.	Often (23,3-31,1)	15	37,5
5.	Always (31,2-38,8)	2	5,0
	<b>TOTAL</b>	<b>40</b>	<b>100,0</b>

Source: Primary Data Analysis, 2021

Based on Table 4.5. it can be seen that the majority of farmers (37.5%) stated that activities held by the food barn management had a frequent level of intensification, 30% of farmers stated that activities from the food barn were only held occasionally, 22.5 % of farmers stated that there was never any activity held by the barn, 5% of farmers stated that it was rare, and the last 5% of farmers stated that activities held by granary administrator had frequent intensification levels.

The variety of answers that occur is related to the level of activeness of farmers participating in activities held by the management of the barn. Farmers who are administrators of farmer groups and participate in the construction of barns tend to be more active in participating in the activities of the barns. In contrast, farmers who are not administrators and do not participate in the construction of barns tend to be less active in participating in the activities of the barns.

#### *4.3.2. The Ability of the Barn to Meet Farmers' Food*

The ability of the barn to meet the farmers' food is one of the factors that are thought to influence the perception of farmers because by fulfilling the food needs of farmers, the level of dependence of farmers on food barns will increase. If the food needs of farmers can be met by the food barn, the farmer's perception will increase or have a positive value. In this study, the experience of farmers was grouped into five categories, including very poor (0-20%), poor (21-40%), undecided (41-60%), able (61-80%), and competent (81-100%).

**Table 4.6.** Distribution of the granary ability in meeting the food of farmers needs in the Canden Village in 2020

No.	Category (score)	Total (person)	Percentage (%)
1.	Very Poor (0-11,8)	2	5,0
2.	Poor (11,9-23,7)	5	12,5
3.	Undecided (23,8-35,6)	18	45,0
4.	Adequate (35,7-47,5)	15	37,5
5.	Competent (47,6-59,4)	0	0,0
<b>TOTAL</b>		<b>40</b>	<b>100,0</b>

Source: Primary Data Analysis, 2021

Based on Table 4.6, it can be seen that the majority of farmers (45%) who are doubtful that the food needs of farmers can be met by food barns. In addition, there are 37.5% of the total interviewees are in the capable category, meaning they believe that the food needs of farmers can be met by food barns, while 12.5% of farmers state that they cannot afford it, and the remaining 5% of farmers state that they are very incapable. The results obtained indicate that most farmers stated that the food barns were still unable to meet the food needs of farmers in the Canden Village.

#### 4.3.3. Food Barn Manager Liveliness

The liveliness of the barn management is the level of activeness of the barn management in holding an event for the benefit of farmers. The more active the management, the better the farmer's perception of the food barn. In this study, the activeness of the management was grouped into five categories, which is never (0-20%), rarely (21-40%), sometimes (41-60%), often (61-80%), and always (81-100%).

**Table 4.7.** Activities Distribution of Food Barn Managers in Canden Village

No	Category (score)	Total (Person)	Percentage (%)
1.	Never (0-7,8)	9	22,5
2.	Rarely (7,9-15,7)	5	12,5
3.	Sometimes (15,8-23,6)	11	27,5
4.	Often (23,7-31,5)	15	37,5
5.	Always (31,6-39,4)	0	0,0
<b>TOTAL</b>		<b>40</b>	<b>100</b>

Source: Primary Data Analysis, 2021

Based on Table 4.7, it is known that the majority of farmers (37.5%) stated that the level of activity of the food barn management was frequent or active. In

addition, there were 27.5% of farmers stating that the activities held by the barn administrator only occasionally, 22.5% of farmers stated that there was never any activity by the barn manager, and 12.5% of farmers stated that there are rarely activities held by food barns. The results obtained indicate that the barn management is active only in some members. This results in farmers who rarely even never participate in barn activities.

#### 4.3.4. Food Barns Benefits on Farmers' Food Security Level

The benefits of food barns on the level of food security of farmers are one of the impacts that farmers can feel with the construction of food barns in the Canden Village. The benefits that farmers get from barns are considered to increase farmers' perceptions positively of food barns. The benefits of food barns are grouped into five categories, which is very not useful (0-20%), less useful (21-40%), quite useful (41-60%), useful (61-80%), and very useful (81-100%). The distribution of farmers according to the benefits of barns on the level of food security of farmers in Canden Village is as follows.

**Table 4.8.** Distribution of the Benefits of Food Barns on Farmers' Food Security Levels in Canden Village

No	Category (Score)	Total (Person)	Percentage (%)
1.	Very not Useful (0-11,8)	0	0,0
2.	Less Useful (11,9-23,7)	11	27,5
3.	Quite Useful (23,8-35,6)	7	17,5
4.	Useful (35,7-47,5)	22	55,0
5.	Very Useful (47,6-59,4)	0	0,0
<b>TOTAL</b>		<b>40</b>	<b>100,0</b>

Source: Primery Data Analysis, 2021

Based on Table 4.8, it is known that the majority of farmers (55%), stated that there were benefits they felt from the existence of a food barn. 17.5% of farmers stated that the food barn was quite useful, and 27.5% of farmers stated that it was less useful. This can indicate that most farmers feel the benefits from the construction of food barns, both in terms of information, family food security, and agricultural facilities in the Canden Village. However, the benefits of this food barn cannot be felt by all members of the farmer group because the management are less active.

### 4.3.5. Distance between Farmer's Residence and Food Barn

The distance of the farmer's house is one factor that is thought to affect farmers' perception of the food barn. The farther the distance from the farmer's house to the food barn, the less information is obtained from the food barn. This can happen because, in the Canden Village itself, there are 15 villages, each of which has a farmer group and is incorporated in one Farmers Group Association of the Canden Village. The following is a table describing the average distance of the farmer's house per village sampled from the food barn.

**Table 4.9.** Distribution of Benefits of Food Barns on Farmers' Food Security Levels in Canden Village

No	Villages	Distance (km)	Description
1	Kralas	1,0	Near
2	Sanggrahan	2,0	Near
3	Wonolopo	3,0	Near
4	Kiringan	3,0	Near
5	Canden	0,5	Near
6	Jayan	1,0	Near
7	Gadungan Kepuh	6,0	Far
8	Ngibikan	4,0	Far
<b>Average</b>		<b>2,5</b>	

Source: Primary Data Analysis, 2021

Based on Table 4.9, that of the eight villages selected as sampling sites in Canden Village by purposive sampling method, farmers who live in Gadungan Kepuh are the villages with the furthest distance from the food barns located in Padukuh Canden. The average farmer who is taken as a respondent and resides in Padukuh Canden has an average distance from the house to the barn of 0.5 km. Based on observations from this study, the farther the distance from the farmer's residence to the food barn, the lower the farmer's perception of the food barn. This is because the distribution of information, the activeness of the management, and the activities of the food barn are not evenly distributed.

### 4.3.6. Farmers' Perception of Food Barns in Canden Village

Perception is the result of concluding all the information that a person absorbs from his environment, which helps him interpret things, selecting, organizing, and translating information to create a specific picture of the information. In this study, the perception that wants to be assessed is the perception of farmers about the existence of a food barn in the Canden Village and what factors can shape and influence the farmer's perception of the food barn. The higher the level of farmer perception, the higher the support and participation of farmers for the activities carried out by the food barn. Perceptions in this study can be classified into five categories, which is very

bad (0-20%), not good (21-40%), doubtful (41-60%), good (61-80%), and very good (81- 100%).

The distribution of the level of perception of the food barns in the Canden Village is as follows.

**Table 4.10.** Distribution of Farmers' Perception Levels of Food Barns in Canden sub-district

No	Category (score)	Total (Person)	Percentage (%)
1	Bad (0-25,5)	9	22,5
2	Good (25,6-51,1)	31	87,5
<b>TOTAL</b>		<b>40</b>	<b>100,0</b>

Source: Primary Data Analysis, 2021

Based on Table 4.10, most farmers in Canden Village have an excellent perception of food barns with a total percentage of 87.5%. This good perception can show that there is a high expectation of farmers to utilize and develop food barns in their village so that they can develop even more in the future.

## 5. DISCUSSION

### 5.1. The motivation of Farmers in Applying the Organic Agriculture as an Effort for Food Security in Karanganom sub-district, Klatten Regency

Organic farming is an agricultural system that only uses natural ingredients in agricultural activities to preserve the environment. At first, some farmers in Gempol Village wanted to implement organic farming because of the desire to preserve the environment, such as soil fertility and the desire to get healthy food.

There was an initiation to implement organic farming from one mover who often had discussions with agricultural extension workers about organic farming. After several harvests and knowing that organic agricultural yields are increasing, the Gempol Village Government held counseling for organic farmers with the sources of the Central Java Provincial Agriculture Office in 2018 regarding organic agricultural cultivation. In addition, several institutions assist organic farmers in the land cultivatons and there are also offers of cooperation with educational institutions (universities) and hospitals for the sale of 8 tons of product every month so that farmers are interested in joining and increasing numbers of farmers. They were implementing organic farming.

Farmer motivation is encouragement and strength from within or the surrounding environment to take action to carry out activities to achieve goals or meet the needs of existence, relatedness, and growth. The need for existence is a basic need related to physiological. The need of relatedness is the need to communicate or relate to other people. The need for growth is the need for self-actualization, freedom of opinion, and gaining respect.

According to the need for existence, the motivation component has a percentage value of 87.03%, classified as very wanted. This is following the objectives of the application of organic agriculture, which aims to fulfill food or efforts in food security.

The element of relatedness needs as a percentage value of 87.43%, classified as very wanted. This percentage indicates that the urge of farmers to apply organic agriculture as an effort to food security in Karanganom sub-district to meet relatedness needs is relatively high. The need for relatedness is essential in supporting the life of farmers because humans are social creatures, so they need to establish relationships or communication with other people is needed. Good communication has a good impact, especially there will be a sense of helping each other, strengthening each other, and collaborating to improve the quality of self or group.

The percentage of the results of growth needs, which is 88.10%, is included in the category of strongly agree. Farmers need growth needs as motivation to enhance their quality and develop their potential and efforts to continue to advance the pioneering farming.

Based on the hypothesis proportion test results, it is known that the calculated Z value of the study is 4.487 with the Z table value of 1.645. It is concluded in this study that the value of Z count  $Z_\alpha$ , then  $H_0$  is rejected, and  $H_a$  is accepted. So, more than or equal to 50% of farmers have high motivation to implement organic agriculture to food security in Karanganom sub-district.

## **5.2. Adoption of Jajar Legowo Planting System Technology in Pendowoharjo Village, Sewon sub-district, Bantul Regency**

The adoption of farmers on the technology of the *jajar legowo* rice planting system can be interpreted as a change in farmers' knowledge, attitudes, and skills in accepting the technology and then followed by a willingness to apply the technology independently their farming business. One way to measure the level of *jajar legowo* planting system technology adoption by farmers in Pendowoharjo Village is through value interpretation based on each adoption indicator. The level of farmer adoption consists of aspects of making planting rows, planting, fertilizing, and controlling weeds, pests and diseases. Furthermore, through the interpretation of the adoption indicators, the technology of the *jajar legowo* rice planting system by farmers in the Pendowoharjo Village is 81.73%. This means that farmers in the Pendowoharjo Village already have a high adoption of the *Jajar legowo* rice planting system technology because almost most farmers always apply every aspect of the planting system technology.

Based on Table 4.3, the aspect of making planting rows has a percentage of 85.33%. This shows that

farmers always make planting rows according to the recommendations on the *jajar legowo* planting system, which includes draining water 1-2 days before making the planting row, making planting rows according to the *Jajar Legowo* type using the help of a rope stretched from end to end, and making planting rows with a spacing of 25x12,5x50 cm.

The second aspect used to measure the level of technology adoption of the *jajar legowo* rice planting system by farmers is the planting aspect. Based on Table 4.3, the planting aspect has a percentage level of 81.50%. This value indicates that farmers always carry out rice planting procedures based on the recommendations in the *jajar legowo* planting system, which include the use of superior/labeled seeds for nurseries, the use of rice seeds less than 21 days old, the use of 1-3 rice seeds per planting hole, and the addition of inserts in the *Jajar legowo* planting row.

Aspects of fertilization include the type of fertilizer used and the technique of fertilizing rice using the *Jajar Legowo* planting system. Based on Table 4.3, the fertilization aspect has a percentage level of 87.50%. This shows that farmers always carry out rice fertilization procedures based on recommendations in the *jajar legowo* planting system, which includes fertilization through empty rows on legowo row, and fertilization is carried out from left to right or vice versa in a coherent.

The last aspect is the aspect of controlling weeds, pests, and diseases contains the technical control of weeds, pests, and diseases in the *jajar legowo* rice planting system, which includes observing the number of pests and diseases in farmers' rice plants, controlling pests and diseases only when the rice plants begin to experience severe damage and then Weeding is done through the spacing between rows of *Jajar legowo* and pesticides for pest and disease control. Based on Table 4.3, the aspect of controlling weeds, pests, and diseases is 72.59%. This shows that farmers often control weeds, pests, and diseases according to the recommendations applied to the *jajar legowo* rice planting system.

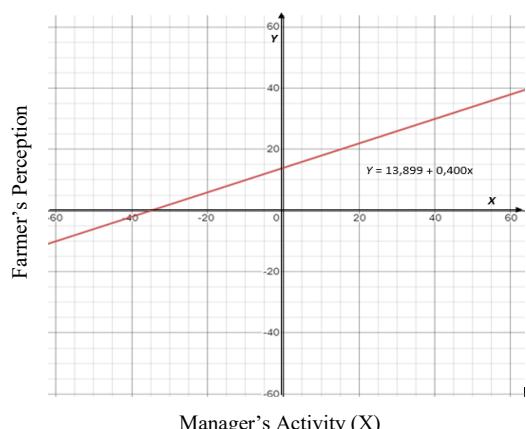
The rice planting system adoption level measurement by farmers in the Pendowoharjo Village is also carried out based on the proportion test. This proportion test aims to compare farmers who have a high level of technology adoption of the *jajar legowo* rice planting system with farmers who have adopted the technology of the *jajar legowo* rice planting system in the Pendowoharjo village. Based on the proportion test, more than 50% of farmers had a high technology adoption of the *jajar legowo* rice planting system. This can undoubtedly be a good start for extension workers in developing technology adoption of the *jajar legowo* rice planting system in Sewon sub-district because farmers in one of the villages have adopted the planting system even with a high adoption rate.

### 5.3. Factors Affecting Farmers' Perceptions of Community Food Barns in Canden Village Jetis sub-district, Bantul Regency

Based on the outcomes of multiple linear regression analysis of the factors that are thought to influence farmers' perceptions of food barns in Canden Village, there are only two factors that affect farmers' perceptions, namely the activeness of the management and the benefits of the food barns on the level of food security of farmers. Following the explanation explained by Goldstein and Umstot<sup>[3]</sup>, perception arises because of information and the influence of one's environment. The following will explain the factors that influence the perception of farmers in the Canden Village.

#### 5.3.1. Manager Liveliness

In an organization, if the management has a good working capacity, is active in carrying out organizational activities, and often socializes with its members, the organization will run well and vice versa. The managements' activity in the study was carried out by looking at the farmers as members of farmer groups who deposit their harvests to the food barn. The level of activity of the barn management is assessed in terms of the number of interactions carried out with members, the intensity of meetings, work, and responsibilities, and the results received by farmers. Based on the multiple linear regression analysis that has been carried out, it is known that the management activity variable has a significant influence on farmers' perceptions of food barns in Canden Village. This can be seen based on the value of the regression coefficient (B) of the management activity variable, which has a value of 0.400, which shows a positive value so that the influence of the management activity variable on the perception of farmers is unidirectional, i.e., the better the level of management activity, the better the farmer's perception of the barn. food.



**Figure 5.1** Graph of the Effect of Management Activity Variables on Food Barns in Canden Village.

(Source: Primary Data Analysis, 2021)

Based on Figure 5.1 and the regression equation explained, if the activity factor of the food barn management (X) is 0, then the farmer's perception is worth 13,899. Based on the regression equation of the factor of the benefit of the food barn on the level of food security of farmers, it shows that the value of X is as follows:

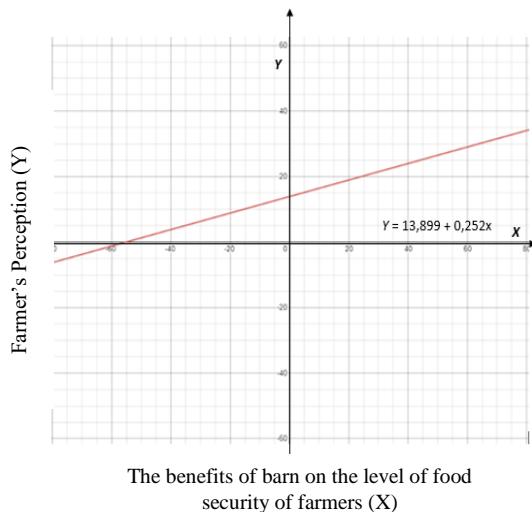
$$\begin{aligned} Y &= 13,899 + 0,400x \\ 0,400x &= -13,899 \\ x &= -13,899/0,400 \\ x &= -34,747 (-35) \end{aligned}$$

From the analysis results, The farmers already have their perception of the food barn without influencing the management activity variable. When perception (Y) has a value of 0, then the administrator's activity variable (X) is -35, meaning that the more active the management, the better the level of farmers' perception of the barn.

Based on the results of field observations, farmers have high expectations of barns management in providing innovation and maximizing the ability of food barns in Canden Village. However, the problem they face is that there is no management regeneration from the core barns management from the beginning of the construction of the food barns in 2013 until 2021.

#### 5.3.2. Benefits of Food Barns on Farmers' Food Security Level

The benefits of food barns on the level of food security of farmers are a beneficial impact and can be felt by farmers after the construction of food barns. In this study, based on the multiple linear regression analysis that has been carried out, the variable of the benefits of barns on the level of food security of farmers has a significant effect on farmers' perceptions of food granaries in Canden Village. This is known based on the value of the regression coefficient (B) on the factor of the benefits of barns on the level of food security of farmers of 0.226, which shows a positive value, so that the influence of the benefits of barns related to food security of farmers is unidirectional, which means the better the benefits that can be felt by farmers related food security due to the existence of food barns, the higher the perception of farmers towards food barns.



**Figure 5.2** Graph of the Effect of Variable Benefits of Food Barns on Farmers' Food Security Levels on Farmers' Perceptions of Food Barns in Canden Village

(Source: Primary Data Analyst, 2021)

Based on Figure 5.2 and the regression equation that has been explained, it shows that if the benefit factor of the food barn on the level of food security of farmers (X) is 0, then the perception of farmers is 13,899. Based on the regression equation of the factor of the benefit of the food barn on the level of food security of farmers, the value of X is as follows:

$$\begin{aligned} Y &= 13,899 + 0,252x \\ -13,899 &= 0,252x \\ x &= -13,899/0,252 \\ x &= -55,154 (-55) \end{aligned}$$

From the analysis results, it is known that farmers already have their perceptions of barns without the influence of the variable benefits of barns on the level of food security. When perception (Y) has a value of 0, then the value of the variable value of the benefit of the barn on the level of food security (X) is -55, meaning that the higher the benefits that can be given to the level of food security of the farmer, the better the perception of the farmer towards the barn.

The need for understanding and coordination of administrators and members of farmer groups is very much needed. Unfortunately, the food barn, which was established to maintain the people's food security in the Canden Village, only has a function as a cooperative group in terms of grain lending and is not used as an active storage area it should be. The barn manager must receive direction and be given an example to manage farmers' crops by utilizing food barn facilities so that the function of the barn can be maximized.

## 6. CONCLUSION

- More than 50% of farmers in Karanganom sub-district have high motivation in implementing organic agriculture as an effort to food security, which is 88.10% in the category of very wanting.
- More than 50% of farmers in Pendowoharjo Village, Sewon sub-district, Bantul Regency have a high level of technology adoption of the *jajar legowo* rice planting system, which is 81.73% with the intensity of adoption always.
- The factors that influence farmers' perceptions of food barns in Canden Village are the activeness of the management and the benefits of food barns on the level of farmers' food security.

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