

# The Sustainability of Household-based Urban Farming in Yogyakarta City

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## ABSTRACT

Due to the quantity and quality degradation of urban land for farming activity, the Yogyakarta City Government has started to conduct studies to prove the importance of developing an urban farming program. Based on the studies, it is known that implementing urban farming in the form of a household-base can be the solution to the urban land degradation issues. This program aims to recover the capability of urban land, that is currently limited, in providing food needs for the community. To reach these aims, this program has been designed on a household scale. Therefore, it is expected that the community can keep the household-based urban farming activities for sustainability in the future. Therefore, this research was conducted to investigate the community's intention to adopt the technology in the household-based urban farming program and sustain the program. This research is located in two subdistricts, Kraton and Kotagede, which have already implemented the program well. The respondent was taken from two representative groups of each sub district, so the total number of respondents was 48 people—the research method used analytical descriptive while the collecting data method used survey. The survey shows that the technology application is influenced by farmers' attitudes and the group role. Besides that, the technology application in household-based urban farming has significantly affected the sustainability of the program.

**Keywords:** *urban farming, sustainability, household-based, technology application.*

## 1. INTRODUCTION

Statuses of urban land are now experiencing a decline in quality and quantity used as land cultivation agriculture. It is encouraging their assessment of the importance of developing agriculture in urban areas so that the area of the urban back has power support to meet the needs of people, mainly for the needs of the food. In line with this, Indrawati (2018) states that we are now facing a rapid development of infrastructure that has resulted in a decline in agricultural production for daily consumption [3]. This has become a threat to the nation's food security. Urban farming is a solution worth to conducted to fulfill the need for food supplies in urban areas. Further than the food security issue, urban farming

is also oriented to contribute to local economics [2]. Urban farming has some advantages compared to regular farming activity, such as land-use efficiency, better harvest quality, and ease of growing [4].

The Government of Yogyakarta has looked that it is essential to carry out the implementation of urban farming. Then it was manifested in the form of an urban farming program to the citizen of Yogyakarta. According to Grebitus et al. (2020), the urban farming activity offers the opportunity to provide fresh, local food to urban communities. However, urban farming can only be successfully embedded in urban areas if the community perceives urban farming positively and accept urban farms in their community. The success of urban agriculture is rooted in a positive perception of the

community and the perception strongly affects acceptance of farming within every individual [5].

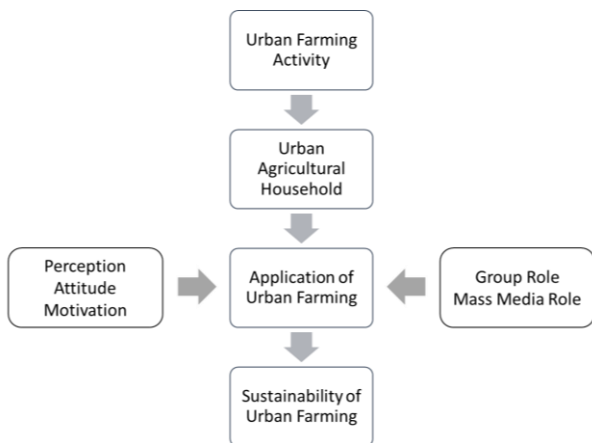
In the implementation of the urban farming program, formed groups based on the surrounding of sub-districts. At the beginning of the program implementation, the community was giving counseling, extension, and assistance with facilities to implement urban farming. However, over time, it is expected that the community can independently continue the program without assistance and support from the government. Pearson et al. (2010) state that the sustainability of an urban agriculture activity is related to three dimensions: social, economics, and environment. Thus, a strategy needed to be applied so that the community can continue the development of household-based urban farming independently by collaborating with those three aspects [6].

Underlying some conditions mentioned above, this research was conducted to see how the community's response to the program of urban farming that the government has given. Community response in this study was measured by applying urban farming as a new technology in the community carried out on a household basis. The application of urban farming then becomes an indicator to predict the prospects for sustainable development of urban farming that is household-based.

**2. RESEARCH FRAMEWORK AND HYPOTHESIS**

**2.1. Research Framework**

Based on the purpose of the research, then drafted a framework of thought which is presented in **Figure 1**.



**Figure 1.** Framework used as the research operating reference

**2.2. Hypothesis**

Based on the research framework above, it can be formulated some hypothesis as follows:

1. It is predicted that the factors of attitude, perception, motivation, group role, and community media affect the level of application of urban farming technology.
2. It is predicted that the level of application of urban farming technology affects the sustainability of urban farming.

**3. RESEARCH METHOD**

The primary method used in research is the method descriptive with approach quantitative. Methods descriptive aimed to provide an overview of detailed and accurate use of data to explain a series of stages and mechanisms of cause - consequence. Approach a quantitative measure of facts objectively, which occurs the separation between data and theory used in research [7]. Research data was collected using the survey technique. This research was conducted in two Subdistricts in Yogyakarta City, which are Kotagede and Kraton.

**3.1. Hypothesis Testing**

The first hypothesis aimed to investigate the factors that supposedly influenced the adoption of urban farming. This hypothesis was tested by using analysis of multiple linear regression with the equation as follows:

$$Y = A + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e \quad (1)$$

- Y : application of urban farming technology
- A : constant value
- b1 -b5 : regression coefficient
- X1 : Perception
- X2 : Attitude
- X3 : Motivation
- X4 : Group Role
- X5 : The Role of Mass Media
- E : error value

The second hypothesis was tested by using simple linear regression. It aims to prove the effectiveness of the urban farming application on the sustainability of urban farming. Thus, the statistical test formula is:

$$Y = A + bX + e \quad (2)$$

- Y : application of technology
- A : constant value
- b : regression coefficient
- X : sustainability
- e : error value

F-test proves the test criteria. Commonly, it is conducted by comparing the value of F count and F table, but in this research, the proof can be seen from the significant value in the regression output table of SPSS software. The value of  $\alpha = 0.05$  measures the influential variable. If the value of significance on the table the

regression results are in the bottom figure 0.05, then the regression equation was significant or in the whole equation are significant in explaining the variable dependent (Y), i.e., the sustainability of urban farming.

## **4. RESULT AND DISCUSSION**

### **4.1. Farmer Characteristics**

#### *4.1.1. Perception*

Perception is a process of interpretation carried out by individuals against something that is seen and felt. Average perception of farmers towards implementing urban farming entered in the category of good, which amounted to 77.83%. However, there is still the perception of farmers being hesitant about the ease in the supply of land for urban farming and ease in providing pesticides to tackle pests and diseases of plants in urban farming.

For farmers, urban farming activities are not only for the kitchen supplies but also for aesthetic value for the beauty of the urban environment. Urban farming activity done in Yogyakarta does not use non-organic material to overcome pests and diseases in crops. It was because the farmers are educated well about the biological pesticide in controlling pests and diseases. The system adopted is very environment-friendly to keep it fertile over time.

#### *4.1.2. Attitude*

Attitude consists of three parts, namely cognitive, affective, and cognitive. The attitude of farmers d natural application of urban farming has a mean of 72.12%, which is included in the agreed category. Farmers stated they agree because in urban farming, the equipment needed is relatively easy to obtain, and by doing urban farming, they can open up opportunities for new business. The equipment needed in urban farming activities is often bought as a collective or group to make it easier for the farmers to carry out urban farming activities. Besides that, the harvest of the urban farming activities can be sold as a group or as an individual. Thus, they found that urban farming can open up opportunities for business for farmers who live in urban territory. Furthermore, most farmers grow vegetable crops in urban farming activities such as eggplant, bean, cabbage, kale, tomatoes, chili, etc. Therefore, farmers and their family members usually consume vegetable crops resulting from urban farming activities.

#### *4.1.3. Motivation*

In this research, the farmer's motivation was investigated by using the theory of Alderfer, namely the need to defend life (existence), the need to relate socially with others (relatedness), and the need to develop himself

(growth). Based on the needs of farmers to survive life, relate socially with other people, and develop themselves, the motivation of farmers in adopting urban technology farming is indicated by a mean of 78.49%, which is included in the category of wants. It means that the level of farmers' motivation in adopting urban technology farming is classified as high, so farmers want to apply the technology of urban farming to fulfill their needs. Therefore, the motivation of farmers to adopt urban technology farming can meet the needs of food growers and be a source of earning extra if businesses experience failures. Besides that, the adoption of urban technology farming can also create a good relationship with other people, providing a lot of insight and new knowledge. In terms of this, the increase in farmers' capacity is significant because the farmer's skill and creativity in adopting urban farming technology can encourage the fulfillment of their needs.

#### *4.1.4. Group Role*

The women farmers group is institutional farmers who organized the farmers in float farming. Farmer groups function as a forum for learning to improve knowledge, attitudes, and skills and a vehicle for cooperation and driving the activities of its members. The role of the group of farmers in the application of urban farming technology has an average of 73.91%, which is included in a category often, it means a group of farmers often carry out its role as a medium of learning and media cooperation. Besides that, the role of the farmer's group who always accommodate its members in giving knowledge regarding the cultivation of vegetables, care vegetable processing results of cultivation, provide the means of production and equipment for cultivation, as well as provide an agreement that relates to the activities of urban farming.

#### *4.1.5. Mass Media Role*

The development of information and technology has been having a very significant effect in adopting household-based urban farming. Information in this term can be information about the weather, how to control pests and diseases in plants, the use of fertilizers and pesticides in a good and right way, and the other information related to the practice of agriculture. In this case, it can make it easier for farmers to access information in the form of new knowledge for farmers.

Based on the information needs of farmers, the level of utilization of information and technology on farmers in adopting urban farming technology has an average of 28.60%, which is included in the rare category. It is because farmers rarely take advantage of information and technology in the adoption of urban farming technology that is caused by some various obstacles, including the low level of education, the limited skills of farmers in the

use of information and technology, as well as the limitations of capital so that farmers are not fully able to purchase and utilize information and technologies that exist. However, this research shows that farmers do not ever use the internet to provide capital for urban farming. In terms of this, an increase in the ability of farmers to use information and technology is significant because things are capable of supporting the development of farming, increasing productivity, and bringing many innovations ahead.

**4.2. First Hypothesis Testing**

Adoption or application is a process that occurs when the first-time people are adopting (accept, implement, using new things). To adopt an innovation, a person requires a specified period, from people who receive an update to an adoption [1]. Therefore, the urban farming technology adoption level can be categorized into five: not never, rarely, sometimes, often, and always.

Farmers classified in a category often to use the seeds ahead for the purchase of seeds is often performed by a collective or group with a group of farmers. However, for treatment, farmers sometimes use plant-based pesticides. This might be caused by the manufacture of the pesticide plant that is a little complicated compared to the purchase of pesticide chemicals in the store. From the research can also be seen that the farmer always uses the land yard for urban farming activities. Not only own land together belongs to a group, but each farmer also has land to grow their own, and usually by utilizing land yard were there. Land owned by farmers majority is narrow land that forces the farmers to apply the system of hydroponics and use the system verticulture in the activities of urban farming. Farmers in the conduct of urban farming activities always pay attention to the aesthetics or beauty of the planting system for home growers located in urban areas so that farmers want to add to the beauty of its surroundings with plants of urban farming.

**Table 1.** Results of Multiple Linear Regression Analysis about the Influence of Attitude Factors and Group Roles on Urban Farming Adoption

Analysis Result	B	Sig.	Description
Attitude	0,226	0,088*	* Significant in $\alpha=0,10$
Group Roles	0,179	0,032**	** Significant in $\alpha=0,05$
Constant	-7,760		
Adjusted R Square	0,129		
F Table	3,204		
F Count	4,478		

Based on the results of the analysis of test regression linear multiple, note that the adoption of the urban farming technology is significantly affected t by the attitude and role of the group. The success of the adoption process of urban farming technology, in this case, cannot be separated from the attitude and role of the group. The behavior of the urban farming adoption depended on the attitude of farmers towards technology, although the attitude of a person is not always consistent with his behavior. However, there is the influence of the big against the behavior of farmers in adopting urban farming technology, namely the role of the group. The attitude of farmers towards adopting the technology urban farming views of necessity means infrastructure that is easy to obtain and can open up new business opportunities. In addition, it can complete the needs of family’s nutrition and reduce the expenses for food needs. Meanwhile, the role of the group becomes medium of learning for farmers in providing knowledge and skills in adopting urban farming technology.

Because it is, any increase in one unit of the attitude will increase adoption of the urban farming technology amounted to 0.226 units. Meanwhile, an increase in one unit of group role will increase the adoption of urban farming technology by 0.179 units. From these results obtained the equation below:

$$Y = -7.760 + 0.226X_1 + 0.179X_2 \tag{3}$$

Y is the adoption of a variable that is significantly influenced by the attitude (X1) and the group role (X2). If the value of X1 and X2 for 0, then the value of Y (application of urban farming) becomes amounting to - 7.760.

**4.3 Third Hypothesis Testing**

The sustainability of urban farming is included in the category of interest. Women farmer groups in Yogyakarta felt the benefits of urban farming activities are one of them, namely to the needs of aesthetics or beauty of the environment. However, not a few members

of the women farmer group already feel the economic benefits of managing the harvest processed of urban farming activities.

Besides that, an indicator for a low percentage is in the indicator's ability to continue the application of the technology of urban farming is the ability to continue the application of the urban farming technology includes the category interested. The indicator is interesting because urban farming can provide kitchen supplies and improve the skills of group members. However, the indicator category becomes most low due to farmers' lack of knowledge in controlling pests and diseases. If pests and diseases attack the plants, farmers cannot control the attack, so training that can educate the farmers about the control of pests and diseases using pesticide plant-based and biological is urgently needed.

**Table 2.** Simple Regression Analysis on the Implementation of Urban Farming to the Sustainability of Urban Farming in the City of Yogyakarta

Analysis Result	B	Sig.	Description
The Implementation of Urban Farming	0,523	0,001	Significant in $\alpha=0,05$
Constant	38,291	0,000	Significant in $\alpha=0,05$
R Square	0,207		
F Table	4,05		
F Count	11,999		

The simple linear regression test resulted the analysis towards the effect of the level of urban farming adoption on the sustainability of urban farming. It can be seen that the application of urban farming significantly affects the sustainability of urban farming. Every increase in the adoption of urban farming will increase 0,523 units of the sustainability of urban farming. Thus, from the results that have been obtained equation:

$$Y = 38.291 + 0.523X \tag{4}$$

In this case, Y as the sustainability of urban farming, is significantly affected by the implementation of urban farming represented as X. If X is worth 0, then Y has a valuable 38291. In the table above, the F Count is 11,999, and F Table is 4,05, meaning that the F Count > F Table, it can be concluded that this research model is good.

## 5. CONCLUSIONS AND SUGGESTIONS

### 5.1. Conclusion

1. The affecting factors of farmers' household-based urban farming application in Yogyakarta are the attitude of farmers and the group role.
2. The more positive farmers' attitudes towards adopting urban farming, the level of the household-based urban farming application in Yogyakarta will increase.
3. The higher the group role of farmers in urban farming, the higher the household-based urban farming application will be getting higher simultaneously. It is due to their encouragement and spirit of the given group to its members to continue applying the technology of urban farming.
4. The factors investigated but did not significantly impact the household-based urban farming application in Yogyakarta were the perception, motivation, and the role of social media.
5. The application of urban farming has significantly influenced the sustainability of the household-based urban farming application in Yogyakarta. This is regarding the number of people interested in continuing the implementation of urban farming to reduce the expenses for food in the family and add more knowledge, insights, and skills of the community in the cultivation of plants.

### 5.2. Suggestion

1. To support the sustainability of urban farming activities, it is advisable to improve the application of urban farming technology, especially in utilizing biological pesticides to control plant pests and diseases.
2. To activate the participation of community in applying urban farming technology, strengthening the farmer's attitude and increasing the role of women farmer group are needed. Strengthening attitude mainly intended to convince the attitude of the farmers that the application of the technology of urban farming is not difficult. Meanwhile, the role of farmer groups needs to be improved through:
  - a. Provision of knowledge to farmers in the marketing of urban farming products.
  - b. Raise working together activity in the processing and marketing of the urban farming harvests.
  - c. Make an agreement related to the processing and marketing of the urban farming harvest, for example, about the processed products and how to sell them.

## AUTHORS' CONTRIBUTIONS

R.A. and R.W. designed the basic concept of the work. W.A.S., E.M., H.D.H., F.A.P, N.A., and Y.A.H. collected the data.

F.A.P. and Y.A.H. analysed the data and made interpretation.

R.A. and F.A.P. got the article drafted.

R.A. did the critical revision and final approval of the article before published.

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