THE SUSTAINABILITY OF VEGETABLE URBAN FARMING IN YOGYAKARTA CITY

Rafika Putri Dewanggi¹, Irham², & Hani Perwitasari²

^{1,2}Department of Agricultural Socio-Economics, Faculty of Agriculture, Universitas Gadjah Mada Corresponding author: <u>irham@ugm.ac.id</u>

Received: 15 November 2021 Accepted: 5 January 2022 Published: 25 March 2022

ABSTRACT

Conversion of agricultural land in Yogyakarta City reduces the urban vegetable production that prompted the Yogyakarta City government to create a fruit and vegetable planting program for the community through urban agriculture. This research was conducted to know the characteristics of farmers and vegetable farming, the sustainability level, and the factors that affect vegetable farming sustainability in urban agriculture in Yogyakarta. The methods used are descriptive analysis, sustainability index, and multiple linear regression analysis. The results showed the characteristics of urban farmers in Yogyakarta City, namely 50% male and 50% female, 60% of farmers age is above 50 years, and 60% have a minimum high school education. The size of land managed is classified as very small. The commodities cultivated include red chilies, cayenne pepper, mustard greens, and planting with horizontal cultivation techniques. The level of sustainability of vegetable farming in urban agriculture in Yogyakarta City is categorized as quite sustainable. The factors that influence vegetable farming's sustainability in urban agriculture in Yogyakarta City are the farmers' age and the farmers' land size.

Keywords: perception, sustainability, urban agriculture, Yogyakarta City

INTRODUCTION

Urban areas become an attraction for rural communities to seek their fortune in urban areas. This event encourages continuous urbanization in Indonesia. The increasing city population impacts decreasing Green Open Space (RTH) owned by urban areas (Rijal et al., 2018). The decline in the number of green spaces causes decreases in vegetable production in urban areas.

Vegetable production in urban areas has decreased, causing vegetable consumption in urban communities to decrease. In 2015, Yogyakarta vegetable consumption reached 206 per capita per day, while in 2017, it reached 193 grams per capita per day (BPS, 2018). This condition is far from the ideal number of vegetable consumption, which is 300 grams per capita per day. City residents, especially children, consume many vegetables and fruits that are not fresh and consume many processed fast food. This situation encourages the government to provide the Vegetable and Fruit Planting Movement program through the DIY Food Security and Counseling Agency so that urban communities can produce their own food needs. This program can develop urban agriculture in the Province of DIY.

According to Wahyudi (2014), sustainable agriculture is an agricultural practice that is ecologically feasible, economically profitable, and socially responsible. Sustainable agriculture is a farming system that can maintain productivity and

benefits for the community in an unlimited time and can be justified. Sustainable agriculture prioritizes the processing of agricultural ecosystems with high biodiversity.

METHOD

The primary method used in this research is the descriptive-analytic method. The sample of the study area was determined using the purposive sampling method. This research was conducted in Jetis District and Danurejan District, Yogyakarta City. Sustainability of vegetable farming in urban agriculture in the study area is primary data and secondary data related to 3 (three) sustainability dimensions: the ecological dimension, economic dimension, and social dimension. Primary data sources consist of observations, interviews, and discussions with relevant officials and experts. Secondary data consists of documents. Secondary data sources are institutions, libraries, and electronic media.

Farmers' perceptions of the sustainability of vegetable farming in urban agriculture are measured by several question items which are divided into three aspects, (1) Farmers perceptions of the sustainability of vegetable farming in urban agriculture in economic aspects, (2) Farmers perceptions of the sustainability of vegetable farming in urban agriculture ecological aspects, and (3) farmers perceptions of the

sustainability in the social aspects of urban agriculture.

Before all question items are used for data analysis, it is necessary to test the validity and reliability test on each question item used. Validity and reliability tests are needed to ensure that each question item can be used to indicate accurate and consistent measurements (Widjaja & Sandjaja, 2013). This test was carried out with the help of the SPSS 23 program. According to Sugiyono (2012), if the significance value of r is more than 0.30, it can be concluded that the statements that make up the variables are valid. Reliable statement items are based on a Cronbach alpha value greater than 0.60 (Sugiyono, 2012). After all, indicators are declared valid and reliable. The first hypothesis can be tested, which states that it is assumed that the level of sustainability of vegetable farming in urban agriculture is based on the perception of farmers

in Yogyakarta City that it is quite sustainable by using a sustainability index of the level of sustainability is carried out using the sustainability index approach.

How to determine the sustainability index,

Sustainability index:

(score obtained) / (maximum score) X 100%

To find out the status of agricultural sustainability in urban plots is used as follows (Thamrin et al., 2007):

- a. Index value 00.00 25.00 (bad / unsustainable)
- b. Index value 25.01 50.00 (less / less sustainable)
- c. Index value 50.01 75.00 (sufficient / sufficiently sustainable)
- d. Index value 75.01 100.00 (good / very sustainable)

Table 1. Item of respondent's statement to find out the sustainability of vegetable farming in urban agriculture in the city of Yogyakarta

Label	Statement Items
Q1	Availability of seeds for agricultural production in urban areas
Q2	Availability of organic fertilizer/cages for agricultural production
Q3	Availability of agricultural tools in urban areas
Q4	Availability of natural enemies of pests and plant diseases in urban areas
	Climate/weather suitability level (rainfall, temperature, environmental conditions) for farming in
Q5	urban areas
Q6	Availability of organic / vegetable pesticides for agricultural production
Q7	The level of intensity of crop failure on agricultural land in urban areas
Q8	Increased productivity of agricultural land in urban areas
Q 9	Increased agricultural production in urban areas
Q10	The level of pest and plant disease attacks in urban areas
Q11	Increasing the availability of agricultural land in urban areas
Q12	Improving the quality of agricultural land in urban areas
Q13	The results of farming can meet the needs of family vegetables
Q14	Farm income can meet the daily needs of families
Q15	The ability of farmers to process agricultural products
Q16	Increasing the price of seeds in farming
Q17	Increasing the price of organic fertilizer in farming
Q18	Increasing the price of agricultural equipment in farming
Q19	Increasing the price of organic pesticides in farming
Q20	Support from the surrounding community
Q21	Nearby government support
Q22	Availability of current information
Q23	Availability of available counselors/extension workers
Q24	Farmers' participation in existing extension / mentoring activities
Q25	Participation of young farmers in agricultural activities

Source: Primary Data Analyzed in 2020

Factors that influence farmers' perceptions of vegetable farming's sustainability in applying urban agriculture in Yogyakarta can be tested using multiple linear regression analysis. The hallmark of multiple linear regression analysis is having one dependent variable and two or more independent variables. This study's dependent

variable is farmers' perceptions, and the independent variables in this study are age, education, and size of the plot of land owned.

Y = a +b1.X1+b2.X2+b3.X3+b4.X4+b5.X5

in which:

Y : Sustainability of vegetable farming in the application of urban agriculture in

Yogyakarta City based on farmers' perceptions (index)

: Constants

B1-B5: Regression Coefficient

X1 : Age (y) X2 : Yard Area (m²) X3 : Education (y)

X4: Gender (1 = male; 0 = female)

X5 : Origin District (1 = Danurejan; 0 = Jetis)

RESULTS AND DISCUSSION

Characteristics of farmers and vegetable farming in urban agriculture in the city of Yogyakarta

Respondents in this research consist of 60 respondents involved in urban agricultural activities. Respondents from Danurejan (50%) and Jetis (50%). Related to gender is women (50.00%) and man (50.00%). Age of respondents is 31-40 years old (6.67%), 41-50 (33.33%), 51-60 (31.67%),61 and above is 28.33% Education for respondents: completed primary school (16.67%), graduated from junior high school (21.67%), and graduated from high school with the highest percentage at 36.67%, graduated from higher education (23.33%) and 1.67% were not in school. The distribution of Cultivation Techniques of Farm Vegetable is 48.57 % of respondents used horizontal techniques, and 51.43% used vertical

techniques and commodities cultivated in Yogyakarta is red chili cayenne pepper and mustard greens.

Sustainability of Vegetable Farming in Urban Agriculture Based on Farmers' Perception in the City of Yogyakarta Sustainability of Vegetable Farming from Ecological Dimensions

The sustainability index of vegetable farming in urban agriculture based on farmers' perceptions in the Danurejan sub-district was seen from the ecological dimension is 73.83, classified in the sufficiently sustainable category and Jetis sub-district by 75.56 belonging to the very sustainable category. The index obtained shows that vegetable farming in urban agriculture based on farmers' perceptions in Danurejan and Jetis Districts is not harmful to the ecology and cultivated land. The sustainability index of vegetable farming in urban agriculture in Yogyakarta City is higher in Jetis District than in Danurejan District. It can occur because of the availability of production input, which is easier to obtain in the Jetis District than the Danurejan District. It is driven by the funds raised from the competition won by the farmer groups in Jetis, which is realized in the form of production input so that the Jetis sub-district farmers are very optimistic about the sustainability of vegetable farming in urban agriculture.

Table 2. Sustainability of Vegetable Farming from the Ecological Dimension

T .11	G I - 1 -	_		
Label	Score Interval	Jetis	Danurejan	Yogya City
Q1	1-5	88.67	82.67	85.67
Q2	1-5	86.67	80.67	83.00
Q3	1-5	86.67	80.00	83.00
Q4	1-5	86.00	79.33	81.00
Q5	1-5	76.00	79.33	78.33
Q6	1-5	75.33	76.00	74.67
Q7	1-5	72.00	74.00	73.67
Q8	1-5	70.67	70.67	70.67
Q9	1-5	70.00	69.33	70.33
Q10	1-5	67.33	64.67	67.67
Q11	1-5	64.67	64.67	64.67
Q12	1-5	62.67	64.67	63.67
Sum	1-60			
Average		75.56	73.83	74.69

Source: Primary Data Analyzed in 2020

The average percentage of farmers' perception of vegetable farming sustainability in urban agriculture in Yogyakarta from the ecological dimension is 74.69. The average perception of farmers on vegetable farming

sustainability in urban agriculture in Yogyakarta from the ecological dimension is sufficiently sustainable. This result can occur because most of the agricultural land managed by farmers in Yogyakarta has an environment that can support

agricultural cultivation activities. The results obtained from this analysis follow the results obtained by Gusfarina (2018), who found that the sustainability of yard farming in Yogyakarta is based on the ecological dimension of 78.71.

Furthermore, it can be analyzed to determine the distribution of farmers' level of perception of vegetable farming sustainability in urban agriculture from the ecological dimension. The categorization of perceptions is divided into two. According to Sarwono (2010), perceptions consist of two types: positive perceptions and negative perceptions. Positive perception is an individual assessment of an object or information with a positive view or expected from the object being perceived or existing rules. In contrast, negative perception is the individual perception of particular objects or information with a negative view, contrary to what is expected from the object being perceived or existing rules. In this study, positive perceptions are called good perceptions, and negative perceptions are called bad perceptions. The category of bad perception with a score interval of 1-30, and the category of good perception with a score interval of 31-60.

Based on the analysis, it can be seen that as many as 100 percent of farmers in the city of Yogyakarta have a good perception of the sustainability of vegetable farming in urban agriculture from the ecology dimension. There are no farmers in Yogyakarta who have a bad perception of vegetable farming's sustainability in urban agriculture from an ecological dimension.

Table 3. Farmers Level of Perception of the Sustainability of Vegetable Farming from

The Ecological Dimension				
Level of Perception	Total			
(Score)	(People)	<u>%</u>		
Bad(1-30)	26	43.33		
Good(31-60)	34	56.67		
Sum	60	100.00		

Source: Primary Data Analyzed in 2020

Sustainability of Vegetable Farming Economic Dimensions

The sustainability of vegetable farming in urban agriculture based on farmers' perceptions in the Danurejan District economic dimension gets an index of 51.42. The index is included in the category of sufficient sustainable. Economically, vegetable farming in urban agriculture based on farmers' perceptions in Danurejan District is quite profitable. Sustainability of vegetable farming in urban agriculture based on the perception of farmers in Jetis District from the economic

dimension gets an index of 62.10. The index is included in the category of sufficient sustainable. Economically, vegetable farming in urban agriculture based on farmers' perception in Jetis District is quite profitable.

Table 4. Sustainability of Vegetable Farming from

the Economic Dimension

	C	Index		
Label	Score Interval	Jetis	Danurejan	Yogya City
Q13	1-5	72.00	69.33	70.67
Q14	1-5	69.33	61.33	65.33
Q15	1-5	66.00	50.67	58.33
Q16	1-5	62.67	48.00	55.33
Q17	1-5	57.33	46.00	51.67
Q18	1-5	55.33	42.00	48.67
Q19	1-5	52.00	41.33	46.67
Sum	1-35			
Average		62.10	51.24	56.67

Source: Primary Data Analyzed in 2020

The sustainability index of vegetable farming in urban agriculture based on farmers' perceptions in the Jetis District is higher than vegetable farming sustainability in urban agriculture based on farmers' perceptions in the Danurejan District. It can happen because farmers in Jetis District do not feel constrained by the increase in prices of seeds, fertilizers, and agricultural equipment. Based on Table 4, the average percentage of farmers' perception of urban agricultural vegetable farming sustainability in Yogyakarta from the economic dimension is 56.67. These results indicate that farmers' views in Yogyakarta city on vegetable farming sustainability in urban agriculture in Yogyakarta from the economic dimension are included in the sufficient, sustainable category. Farmer's view or assessment of vegetable farming sustainability in terms of agricultural land ability to meet farmers' economic needs is quite sustainable. It can happen because farmers feel that the agricultural land they manage so far has provided economic benefits.

Table 5. Farmers Level of Perception of the Sustainability of Vegetable Farming from

 The Economic Dimension

 Level of Perception (Score)
 Total (Person)
 %

 Bad(1-18)
 26
 43.33

 Good(19-35)
 34
 56.67

 Sum
 60
 0

Source: Primary Data Analyzed in 2020

Furthermore, it can be analyzed to determine the distribution of farmers' perception of vegetable farming sustainability in urban

agriculture from an economic dimension. The perception of farmers is divided into two categories: the category of bad perception with a score interval of 1-18, and the category of good perception with a score interval of 19-35.

Based on the table, it can be seen that by 56.67 percent of farmers in the city of Yogyakarta have a good perception of the sustainability of vegetable farming in urban agriculture from the economy. As many as 43.33 percent of Yogyakarta farmers have a bad perception of vegetable farming's sustainability in urban agriculture from an economic dimension. It can occur due to urban agriculture, which is considered beneficial for the urban community. Farmers believe that agriculture in the city has good opportunities from an economic standpoint so that it is easy to maintain its sustainability. It is caused by the purchase price of production facilities, wage labor, and agricultural equipment that is still reasonable, and the existence of urban agriculture can support the needs of family vegetables and daily needs.

Sustainability of Vegetable Farming Social Dimensions

Table 6. Sustainability of Vegetable Farming from the Social Dimension

		Index		
Label	Score Interval	Jetis	Danurejan	Yogya City
Q20	1-5	82.67	82.00	82.33
Q21	1-5	81.33	80.00	80.00
Q22	1-5	79.33	80.00	79.67
Q23	1-5	79.33	79.33	79.33
Q24	1-5	79.33	79.33	79.00
Q25	1-5	72.67	70.67	71.67
Sum	1-30			
Average		79.11	78.56	78.67

Source: Primary Data Analyzed in 2020

The sustainability of vegetable farming in urban agriculture based on farmers' perception in the Danurejan sub-district the social dimension gets an index of 78.56. The index is included in the category of very sustainable. Socially, vegetable farming in urban agriculture based on farmers' perception in the Danurejan District is very sustainable. Sustainability of vegetable farming in urban agriculture based on farmers' perception in Jetis District, the social dimension gets an index of 79.11. The index is included in the category of very sustainable.

The sustainability index of vegetable farming in urban agriculture based on farmers' perception of the social dimension in Jetis District is higher than vegetable farming sustainability in urban agriculture based on farmers' perception in the Danurejan District. It can happen because farmers in Jetis District only feel that young

farmers' participation in urban agriculture is a potential obstacle to farming. In the Danurejan sub-district, more than one question item caused farmers to feel that farming vegetables in urban agriculture was quite sustainable.

Based on the table, it can be seen that overall, the level of farmers' perceptions of the sustainability of vegetable farming in urban agriculture in the city of Yogyakarta from the average social dimension is 78.67. This value is included in the category of a very sustainable level of sustainability. These results illustrate that farmers are very confident in Yogyakarta's agricultural land's sustainability from a social standpoint. It can occur because there is a high level of participation in farming activities carried out by farmers and non-farmers, so that from a social standpoint, it is easy to maintain its sustainability.

Then it can be analyzed to determine the distribution of farmers' level of perception of the sustainability of vegetable farming in urban agriculture from the social dimension. The perception of farmers is divided into two categories: the category of bad perception with a score interval of 1-15, and the category of good perception with an interval of scores of 16-30.

Table 7. Farmers Level of Perception of the Sustainability of Vegetable Farming from

The Social Dimension				
Level of Perception	Total			
(Score)	(People)	%		
Bad(1-15)	56	6.67%		
Good(16-30)	4	93.33		
		100.0		
Sum	60	0		

Source: Primary Data Analyzed in 2020

Based on the table, it can be seen that as much as 93.33 percent of farmers in the city of Yogyakarta have a good perception of the sustainability of vegetable farming in urban agriculture from social. 6.67 percent of Yogyakarta farmers have a bad perception of vegetable farming's sustainability in urban agriculture from a social dimension. The table shows that most Yogyakarta farmers have a good perception of the table for farming's sustainability of urban agriculture from a social dimension. These results mean that most farmers have a positive view of vegetable farming's sustainability in urban agriculture from a social dimension. It can be caused by the high level of farmers' participation in farming activities in the city of Yogyakarta, both young and not young farmers. Also, there is considerable support from the government and surrounding communities,

causing farmers to positively view vegetable farming sustainability in urban agriculture from a social dimension.

Factors Affecting the Sustainability of Vegetable Farming in Urban Agriculture Based on Farmers' Perceptions in the City of Yogyakarta

The sustainability of vegetable farming in urban agriculture based on farmers' perceptions in Yogyakarta provides an overview of farmers' views or assessments on vegetable farming sustainability in Yogyakarta's urban agriculture.

Many factors can affect the sustainability of vegetable farming in urban agriculture in the city of Yogyakarta. These factors may include the farmer's age, education, gender, and size of the land plot. Multiple Linear Regression Analysis then analyzes vegetable farming sustainability in urban agriculture based on farmers' perceptions in Yogyakarta. The independent variable is the age of the farmer, education, gender, size of the plot of land, and the dependent variable in the form of each respondent's sustainability index score.

Table 8. Factors Affecting the Sustainability of Vegetable Farming in Urban Agriculture Based on Farmers'

Perceptions in the City of Yogyakarta

Variable	Regression coefficient	t-statistic	Prob-t
С	77.106***	4.085	0.000
Age	-0.775**	-3.352	0.001
Education	0.139	0.512	0.611
Land Width	2.075**	3.334	0.002
Dummy (Sex)	0.226	0.138	0.891
Dummy (Origin)	-0.168	-0.097	0.923
\mathbb{R}^2	0.863		
Standard Error	6.020		
Adjusted R ²	0.850		
F-Hit	67.879		
Prob-F	0.000		

Source: Primary Data Analyzed in 2020

Information:

*** Significant at the level of trust 99% (α = 0.01)

- ** Significant at the level of trust 95% (α = 0.05)
- * Significant at the level of trust 90% (α = 0.10)

Regression constants in the model are significant at the alpha level of 1%, with a regression coefficient of 77.106. The value of the constant is positive, meaning that the influence of other variables outside the regression model is positive for the sustainability of vegetable farming in urban agriculture based on farmers' perceptions in the city of Yogyakarta. Adj Value. R2 of 0.850, meaning that 85% of the dependent variable (sustainability) variation can be explained by the independent variables (Age, Education, Area, Gender), while 15% of the variation is explained by other variables not included model. Probability F of 0.00 is smaller than alpha 1%, causing Ho to be rejected. Ho rejection provides information that the independent variable influences vegetable farming's sustainability in urban agriculture based on farmers' perceptions in Yogyakarta.

Based on the table, it can be seen that the age variable of farmers has a probability of t or significance of t of 0.01. The significance value of t is smaller than the alpha value of 5%; thus, Ho is rejected. Ho rejection provides information that farmers' age influences vegetable farming sustainability in urban agriculture based on

farmers' perceptions in Yogyakarta. The age regression coefficient for farmers is -0.775. The regression coefficient is -0.775, meaning that each increase in farmers' age can reduce vegetable farming sustainability in urban agriculture based on farmers' perception in Yogyakarta as much as 77.5 units. This situation can occur because the age of the farmers who become the majority of the sample is at the adult and elderly levels with a perception level of less than 50% of the farmowned sustainability. Because farmers have physical limitations in conducting vegetable farming and a lack of ability to use technology to support vegetable farming.

The yards managed by farmers in Yogyakarta City show that the plot area has a probability or significance value of 0.002. This value is smaller than the alpha value of 5%, meaning that the Ho value is rejected. Thus, the area of yard area managed by farmers significantly influences vegetable farming sustainability in urban agriculture based on farmers' perceptions of Yogyakarta. The regression coefficient of the yard area is 2.075. The regression coefficient is worth 2.075, meaning that every time there is an increase

in the area of land managed by farmers can increase the sustainability of vegetable farming in urban agriculture based on farmers' perception in the city of Yogyakarta as many as 207.5 units. The size of the plot of land managed by farmers has a significant effect on the sustainability of vegetable farming in urban agriculture based on farmers' perceptions in the city of Yogyakarta because the more significant the area of land owned by farmers shows, the greater farmer confidence in the benefits gained in farming. Encourages farmers to sacrifice their land to be used as yards and to be cultivated.

CONCLUSIONS

Based on the results of the analysis and discussion in the previous chapter, it can be concluded that:

- Characteristics of urban farmers in Yogyakarta, which is balanced male and female, the population of Yogyakarta, the majority are in adulthood, and the highest school educated. The area of land managed is classified as narrow. The commodities being cultivated include red chili, cayenne pepper, mustard greens, and the majority of planting with horizontal cultivation techniques.
- 2. The level of sustainability of vegetable farming in urban agriculture based on farmers' perceptions in the city of Yogyakarta in terms of ecological, economic, and social dimensions is included in the category of quite sustainable.
- 3. Factors that affect the sustainability of vegetable farming in urban agriculture based on farmers' perceptions in the city of Yogyakarta are the age of farmers and the land width used by farmers for vegetable farming in urban agriculture.

REFERENCES

- BPS. 2018. Statistik Indonesia 2018. Badan Pusat Statistik. Jakarta.
- Gusfarina, D.R. 2018. Pemanfaatan Pekarangan Untuk Usahatani Dan Kontribusinya Terhadap Pendapatan Keluarga di Kota Yogyakarta. Tesis. Fakultas Pertanian UGM Yogyakarta
- Motta, R. S. da, & Ortiz, R. A., 2018. Costs and perceptions conditioning willingness to accept payments for ecosystem services in a Brazilian Case. Ecological Economics, 147 (December 2019), 333–342.
 - https://doi.org/10.1016/j.ecolecon.2018.0 1.032
- Rijal, J. P., Regmi, R., Ghimire, R., Puri, K. D., Gyawaly, S., & Poudel, S. (2018). Farmers' knowledge of pesticide safety and pest management practices: A case study of vegetables. Agriculture, 8(16), 1–11.

 https://doi.org/10.3390/agriculture80100
 16
- Sarwono, S. W. 2010. Pengantar Psikologi Umum. Jakarta: Rajawali Pers
- Sugiyono. 2012. Metode Penelitian Kuantitatif dan Kualitatif. R & D Alfabeta. Bandung
- Thamrin, H. Sujono, C. Herison, dan S. Sabiham. 2007. Analisis keberlanjutan wilayah perbatasan Kalimantan barat-Malaysia untuk pengembangan wilayah agropolitan. Jurnal Agro Ekonomi. Vol.25 (02):103-124
- Wahyudi, E. 2014. Analisis produksi, pendapatan, ketahanan pangan dan keberlanjutan usahatani padi di sekitar tambang batubara Kabupaten Kutai Kartanegara. Disertasi. Fakultas Pertanian.UGM.
- Widjaja, F. N., & Sandjaja, S. S., 2013. Uji validitas dan reliabilitas index of teaching stress (ITS). Jurnal Noetic Psychology, 3(2), 104–127.