

Community-Based Urban Agriculture as a Strategy for Sustainable Food Security: Evidence of Yogyakarta, Indonesia

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Abstract. Urban agriculture through a community-based approach will empower residents to transform underutilized space into productive food sources, thereby increasing the food security of households and the surrounding environment. This study examines the role of women farmer groups in optimizing urban home yard utilization in Yogyakarta City through a community-based approach to urban farming, contributing to local food security. Despite having underutilized yards and limited engagement, these women possess significant potential to enhance household and community resilience. Using a quantitative descriptive analysis method, the research sampled 48 respondents selected via Multistage Random Sampling. Findings indicate that women farmer groups play a moderate role as learning hubs, cooperative platforms, and production units in urban farming activities. Spearman Rank Correlation analysis reveals that key factors influencing their role include age, farming experience, participation levels, leadership, agricultural extension support, and government involvement. The study highlights how urban farming, when supported by community-based initiatives, can strengthen food security by empowering women, improving resource efficiency, and fostering collaborative local food production. These insights underscore the importance of policy and institutional support in scaling up urban farming for sustainable food systems in urban areas.

1 Introduction

Land potential can realize food security by yard utilization. Currently, there is a lot of land conversion that hinders agricultural activities, especially in the use of yards. The yard is a resource that has not been utilized for its potential to full fill food for the community and increase economic income. Communities in optimizing their yards need to do planting such as types of horticulture, fruit, or other ornamental plants [1]. Activities to increase the benefits of agricultural land resources into a form of optimizing home yard in agriculture. Land optimization is intended for food crop farming so that food security can be realized in supporting more productive farming. The optimization is carried out such as increasing land productivity by cultivating crops, raising livestock, fisheries, and so on [2][3]. Housewives

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(farmer women) have a role in supporting family food self-Sufficiency. One of the reasons is that food self-sufficiency is part of reproductive role. Basically, the fun action of the household as a unit of consumption, women's reproductive role develops in food independence and household nutrition as a whole and is not limited to their children. The production of food security and household nutrition consists of several interrelated activities, namely food crop cultivation, food procurement, collection and exchange, food preparation and processing, and finally food distribution [4] [5].

To support housewives in adopting the latest technology, it is necessary to form a group called the woman farmer groups. The women farmer groups is a forum for fostering women developed by the government in the technology transfer process, as a learning facility/classroom, a vehicle for collaboration, and a production unit. The role of women affects the potential for the yard as a producer of processed food needs which then the agricultural products go through processing and can be consumed by the community or consumed for themselves and their families. Farm women as housewives not only do housework but can add insight and improve skills in optimizing the use of the yard to support spiritual, skill, and economic needs [6]. The role of women's farming groups in managing urban yards is becoming increasingly relevant with the development of the concept of smart farming, which emphasizes the use of digital technology to support production and marketing. Through group communication, seeking cultivation information, and marketing vegetable alley products via WhatsApp and Instagram, women farmers in Yogyakarta City are able to increase efficiency, information accessibility, and market reach in urban farming activities. The Yogyakarta City Agriculture Office created a program to maintain food security in Yogyakarta city by developing a vegetable village program carried out by a women farmer groups. Formation of women farmer groups who develop urban agriculture to take advantage of the potential of narrow yards for planting. Then, to support agricultural development, which at that time there was a minimal land-use change to be managed by agricultural cultivation in paddy fields. The government participated in assisting in the establishment of the agricultural sector program by relying on home yard land that could be used as a vegetable garden to plant various kinds of vegetables [7].

In addition, there are several categories of people who take part in these farming activities, the first is those who take part in the activities as well as actively participate, the second there are those who follow the activities but only listen, and the third rarely participates in the farming activities[8]. So that in giving free time, women farmer groups are less effective in carrying out their roles. This can be seen from the role of women farmer groups in carrying out yard utilization activities, there are those who play an active role and do not fulfil the needs or selling value of the farming results. The use of home yard has not been carried out optimally because of the busyness or homework that members of the farmer group must take care of their respective homework[6]. So, on average, housewives who are members of women farmer groups have not used their yards optimally [9]. In connection with this, it is necessary to know how the role of women farmer groups in optimizing the utilization of urban yards, as well as the factors related to the role of women farmer groups in the utilization of urban yards in the city of Yogyakarta. We contribute by (i) three role of women farmer group as means of learning, a means of cooperation, and as a unit of production, (ii) testing correlates (age, experience, participation, leadership, extension, government) using Spearman's coefficient correlation, and (iii) drawing policy implications for scaling yard-based urban agriculture.

2 Materials and Methods

We used a descriptive quantitative design to assess the role of women farmer groups in yard utilization in Yogyakarta City. The research location was chosen in the city of Yogyakarta. We applied multistage random sampling and obtained 48 respondents. Samples were selected by *Multistage Random Sampling*, which is a collection that is carried out based on a stratified division in an area and randomly taken with the aim that each sample has the same opportunity to be used as respondents. In this study, out of 14 sub-districts in Yogyakarta City, there are three sub-districts that have implemented the vegetable village program that have received assistance and support according to the direction from the government with the regulations of the Yogyakarta City Agriculture and Food Office. The group of women farmers in the sub-district who have achievements in their respective fields and participate in plant cultivation activities in narrow land yards, namely Danurejan District, Mantrijeron District, and Gedongtengen District. From the three sub-districts, two groups of women farmers were selected in each sub-district based on the group that had carried out the government's urban yard utilization program, namely the vegetable village program according to the rules of the Yogyakarta Agriculture and Food Service with groups that already had seedling houses, vegetable aisles, and group gardens. Then, the use of yards on narrow land was carried out by a group of women farmers, so that six groups of women farmers were obtained to be used in this study. There were as many as eight members from each group of women farmers selected as a research sample selected by *Simple Random Sampling*.

To collect the primary data, respondents were interviewed using semi structure questionnaire. The role of woman farmer groups consists of three main variables: means of learning, means of cooperation, unit of production. All indicators are measured with Likert scale: Never (1), Rarely (2), Sometimes (3), Often (4), Very Often (5) (Table 1).and Rank Spearman analysis was used to analyze the factors that effecting the role of women farmer groups, where demographic respondents become independent variable, and the role of women farmer groups become dependent variable.

Table 1. Role of Women Farmer Groups Variables and Indicators

Variable	Indicator
Learning	To Gain Knowledge
	Providing Information in Farming
	Gaining Skills
	As Motivation and Discipline
	Expressing An Opinion
	Carrying Out Regular Meetings
Cooperation	Cooperation With Other Farming Groups
	Cooperation With Other Institutions
	Cooperation With Agricultural Extension
	Cooperation In Capital Provision
	Cooperation In Procurement of Agricultural Production Facilities
	Cooperation In Nurseries
	Cooperation In Plant Care
	Cooperation In Pest Control
	Cooperation In Harvesting
	Cooperation In Marketing
	Cooperation In the Processing of Agricultural Products
	Cooperation In Problems Solving
	Working Together
	Constructive Group Cooperation

Variable	Indicator
Production	Facilitate Production
	Facilitate The Utilization of Technology
	Capital Procurement
	Procurement Activities of Agricultural Production Facilities
	Have A Joint Effort
	Government Subsidies

Measurement: Never (1), Rarely (2), Sometimes (3), Often (4), Very Often (5)

3 Results and Discussion

3.1 Demographics of Respondents

The identity of the women farmer groups describes the characteristics of the members of the women farmer groups which include age, gender, education level, occupation, and farming experience. Group identity is used to find out the background or condition of each group of women farmers.

Table 2. Demographics of Respondents

Description	Frequency (People)	Percentage (%)
Age (year)		
28-36	7	14.6
37-45	10	20.8
46-54	14	29.2
55-63	10	20,8
64-74	7	14.6
Total	48	100
Education		
Elementary School	5	10.4
Primary School	5	10.4
Senior High School	25	52.1
University	13	27.1
Total	48	100
Farming Experience (Year)		
< 5	25	52.1
6-10	18	37.5
11-15	2	4.2
16-20	2	4.2
> 20	1	2.1
Total	48	100

3.1.1 Role of Women Farmer Groups in Optimizing Yard Utilization in Yogyakarta City

The role of the women farmer groups in the utilization yard became one of the activities carried out in the city of Yogyakarta. The role of each has a function as a means of learning, a means of cooperation, and as a unit of production.

3.1.1.1 As A Means of Learning

Learning facilities are a place for women farmer groups to find and improve knowledge, skills, and attitudes to develop each other independently or groups in utilizing the city yard.

Table 3. The Role Women Farmer Groups as a Means of Learning

No	Indicators	Interval Score	Total Score	Category
1	To Gain Knowledge	1 - 5	3.83	High
2	Providing Information in Farming	1 - 5	3.85	High
3	Gaining Skills	1 - 5	3.75	High
4	As Motivation and Discipline	1 - 5	3.88	High
5	Expressing An Opinion	1 - 5	3.33	Medium
6	Carrying Out Regular Meetings	1 - 5	3.83	High
Total		6 - 30	22.47	
Average			3.74	High

Note :
Low : 1 – 2.33
Medium : 2.34 – 3.66
High : 3.67 – 5.0

Based on the table above the role of women farmer groups as a means of learning has a high category. Efforts in increasing the knowledge of women farmer groups hold regular meetings between groups to discuss, training and coaching activities every month or twice [10]. Get information from extensionists or the government that can be conveyed to other women farmer groups in increasing knowledge and production[5]. In addition, there are groups that are active and less active when disseminating information to be addressed to other groups. Provide real practice to its members so that members feel enthusiastic to follow it to gain knowledge and skills in this regard. Give a positive encouragement to its members to realize discipline to utilize the city's yards to achieve the expected common goal [11]. The group can grow and develop that motivation by actively disseminating information to another women farmer groups. Convey a suggestion or opinion, but not all feel confident to state it when conducting group discussions in solving problem solving[12]. The problem that has been faced based on the statement of women farmer groups one of them is the spread of caterpillar and butterfly pests during the rainy season, then carefully and diligently controlled in the administration of pest drugs.

3.1.1.2 Means of Cooperation

The means of cooperation is to be a forum for peasant women farmer groups in strengthening and strengthening between fellow groups of peasant women and with other parties. In this cooperation in facing a challenge or obstacle becomes more efficient together.

Table 4. The Role Women Farmer Groups as a Means of Cooperation

No	Indicators	Interval Score	Total Score	Category
1	Cooperation With Other Farming Groups	1 - 5	3.54	Medium
2	Cooperation With Other Institutions	1 - 5	3.56	Medium
3	Cooperation With Agricultural Extension	1 - 5	3.71	High
4	Cooperation In Capital Provision	1 - 5	2.98	Medium
5	Cooperation In Procurement of Agricultural Production Facilities	1 - 5	3.17	Medium
6	Cooperation In Nurseries	1 - 5	3.54	Medium
7	Cooperation In Plant Care	1 - 5	3.71	High
8	Cooperation In Pest Control	1 - 5	3.40	Medium
9	Cooperation In Harvesting	1 - 5	3.44	Medium
10	Cooperation In Marketing	1 - 5	3.38	Medium
11	Cooperation In the Processing of Agricultural Products	1 - 5	3.60	Medium
12	Cooperation In Problems Solving	1 - 5	3.63	Medium
13	Working Together	1 - 5	3.73	High
14	Constructive Group Cooperation	1 - 5	3.31	Medium
Total		14 - 70	48.69	
Average			3.48	Medium

Note :
Low : 1 – 2.33
Medium : 2.34 – 3.66
High : 3.67 – 5.0

There are Women Farmers Groups such as Surya Hijau that have collaborated with other groups who are members of Mutansa Alkid to help each other in selling plants every Saturday morning in South Square, Yogyakarta City. Cooperation is carried out with government agencies, urban agriculture offices, and institutions from other parties. The collaboration is to be given motivation, information delivery, various ways to explain related to the use of the city yard by helping the group become better. The Women farmers group provided capital independently, but over time, according to the agreement that had been determined, the management of the women farmer group began to borrow from banks for purposes of utilizing the city yard. Procurement of production inputs, namely seeds from the nucleus garden in the yard, which has a nursery in its own garden [13]. Seeds pick up from groups or distributors in other cities. Some nurseries come from nucleus plantations, and some have collaborated with providers of agricultural production facilities obtained from agricultural institutions. In addition, there are groups that have collaborated with production input providers in the form of seeds and directly bring production inputs to the management of women farmer groups. The group has determined the division of labor for its members in caring for vegetable crops such as watering, cleaning weeds, and providing fertilizer to vegetable crops according to a predetermined schedule. Plant care is carried out twice a week. Pest control can be done individually, so not all groups help control these pests. Pests that often occur in vegetable crops are caterpillars, aphids which are exterminated only by spraying pesticides. There are groups of women farmers who harvest individually, and some do it in groups. The group does marketing of the produce only through the closest environment, such as distribution via WhatsApp to provide information to the group of women farmers that have harvested so that it is ready to be sold, then marketing is carried out to neighbors such as neighbors who work as sellers, open vegetable shops, or food sellers who need the vegetable harvest. women farmer groups participate in the processing of the produce and the division of labor on the processing is carried out. processing the flower plant

into a syrup drink product with a mixture of various spices. The Women Farmers Group had difficulty organizing agricultural utilization programs in a narrow yard, but the group began to improve performance together for agricultural utilization programs to achieve common goals [14]. Cooperation in *gotong royong* is an indicator of this assessment because gotong royong is usually done once a week. Cooperation requires openness and perspectives between groups to create mutual knowledge and trust to achieve common goals.

3.1.1.3 Unit of Production

The unit of production is a facility which as a whole is capable of becoming a unit that can be expanded and developed in order to obtain adequate economies of scale both in terms of quantity and quality. Then it can be used as an evaluation material for the utilization of the city yard as a plan for the needs of the women farmer group.

Table 5. The Role Women Farmer Groups as a Unit of Production

No	Indicators	Interval Score	Total Score	Category
1	Facilitate Production	1 - 5	3.02	Medium
2	Facilitate The Utilization of Technology	1 - 5	3.77	High
3	Capital Procurement	1 - 5	2.75	Medium
4	Procurement Activities of Agricultural Production Facilities	1 - 5	3.21	Medium
5	Have A Joint Effort	1 – 5	3.96	High
6	Government Subsidies	1 - 5	3.27	Medium
Total		6 - 30	19.98	Medium
Average			3.33	

Note :
Low : 1 – 2.33
Medium : 2.34 – 3.66
High : 3.67 – 5.0

There is a production of catfish aquaculture that is cultivated into food products such as fried catfish, catfish chips, and catfish shredded. Flower plants are used as beverage products. Technology utilizing city yards tends to be used for communication between groups, information search, marketing processes are also needed using technology, namely through the dissemination of social media. Creating a website to display profiles, performance achievements, and activities carried out when utilizing the city yard. Women farmer groups also conduct their own nurseries. There is also a woman farmer groups who sells tilapia in the pond in the yard, making it a tourist spot to sell aesthetic value to visitors, then processing vegetable crops into food products. There is also a women farmer group that gets subsidies in the form of goods such as fish farming equipment, namely filters and water pumps, then fish seeds and pellets.

3.1.1.4 Factors Relating to the Role of Women Farmers Groups in Optimizing the Utilization of Yards in the City of Yogyakarta

Factors related to the role of women farmer groups in optimizing the use of city yards can be determined using the Spearman's Rank correlation coefficient test.

Table 6. Factors Relating to the Role of Women Farmers Groups in Optimizing the Yards Utilization in the City of Yogyakarta

	Learning	Cooperative	Production	Role of Woman Farmers Group
Age				
Rs	0.418	0.388	0.430	0.425
Sig.	0.003***	0.006***	0.002***	0.003***
Education				
Rs	0.168	-0.002	-0.106	-0.015
Sig.	0.254	0.989	0.472	0.921
Farming Experience				
Rs	0.449	0.424	0.506	-0.473
Sig.	0.001***	0.003***	0.000***	0.001***
Participation				
Rs	0.788	0.427	0.445	0.516
Sig.	0.000***	0.003***	0.002***	0.000***
Chairman Role				
Rs	0.720	0.667	0.540	0.685
Sig.	0.000***	0.000***	0.000***	0.000***
Agricultural Extension Role				
Rs	0.428	0.324	0.241	0.326
Sig.	0.002***	0.025**	0.099*	0.024**
Government Role				
Rs	0.404	0.611	0.470	0.563
Sig.	0.004***	0.000***	0.001***	0.000***

Note :***Significant $\alpha = 1\%$
 ** Significant $\alpha = 5\%$
 * Significant $\alpha = 10\%$

There is a significant relationship between age, farming experience, participation, the role of the chairman, the role of extension workers and the role of the government with learning facilities at a significance level of 1%. The relationship between age and learning facilities has a fairly strong relationship with a positive direction, with a correlation coefficient value of 0.418. The relationship between farming experience and learning facilities has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.449. The relationship between participation and learning facilities has a strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient of 0.788. The relationship between the role of the chairman and learning facilities has a strong level of closeness, which means the direction of the relationship is positive, with a correlation coefficient value of 0.720. The relationship between the role of the instructor and learning facilities has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.428. The relationship between the role of government and learning facilities has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.404.

There is a significant relationship between age, farming experience, participation, the role of the chairman, the role of extension workers and the role of the government by means of

cooperation at a significance level of 1%. The relationship between age and the means of cooperation has a weak level of closeness, which means the direction of the relationship is positive, with a correlation coefficient value of 0.388. The relationship between farming experience and means of cooperation has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.424. The relationship between participation and means of cooperation has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.427. The relationship between the role of the chairman and the means of cooperation has a strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.667[15]. The relationship between the role of the extension worker and the means of cooperation has a weak level of closeness, which means the direction of the relationship is positive, with a correlation coefficient value of 0.324 at a significance level of 5% . The relationship between the role of government and the means of cooperation has a strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.611.

There is a significant relationship between age, farming experience, participation, the role of the chairman, the role of extension workers and the role of the government and the production unit. The relationship between age and production units has a fairly strong relationship, which means the direction of the relationship is positive, with a correlation coefficient value of 0.430. The relationship between farming experience and production units has a fairly strong relationship, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.506. The relationship between participation and production units has a fairly strong relationship, which means the direction of the relationship is positive, with a correlation coefficient value of 0.445. The relationship between the role of the chairman and the production unit has a fairly strong relationship, which means the direction of the relationship is positive, with a correlation coefficient value of 0.540. The relationship between the role of the extension worker and the production unit has a weak level of closeness, which means the direction of the relationship is positive, with a coefficient value of 0.241 at a significance level of 10%. The relationship between the role of the government and the production unit has a fairly strong level of closeness, which means that the direction of the relationship is positive, with a correlation coefficient value of 0.470. There is no significant relationship between education and learning facilities, cooperation facilities and production units.

4 Conclusions

Based on the results of research and discussions that have been carried out regarding the role of Women Farmers Groups in Optimizing the Yards Utilization in Yogyakarta, Indonesia the following conclusions are obtained the role of women farmer groups in the utilization of city yards is seen from learning facilities, cooperation facilities, and as production units, which are included in the medium category. Based on the results of the Spearman Rank correlation coefficient, the factors related to the role of women farmer groups are age, farming experience, participation, the role of the chairman, the role of extension workers, and the role of the government.

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