



# Profitability and Feasibility of Vegetable Farming in Urban Agriculture A Case in Surakarta City

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**Abstract.** This study aims to: (1) estimate the income and profits, and (2) assess the feasibility of vegetable farming in urban agriculture in Surakarta. The data were generated from 30 respondents. The method that being used in this study are descriptive analytic, R/C Ratio, B/C Ratio, and breakeven point (BEP). With respect to profitability, the result shows that the highest average income and profit is green mustards. The average income of red chili is higher than chili pepper. Chili pepper gives a higher profit than red chili. The study found that the chosen commodities gives feasible outcome. In terms of feasibility, the R/C ratio of chili pepper is the highest followed by red chili and green mustard. However, green mustard is the highest in breakeven point (BEP) on production followed by chili pepper and red chili. For the BEP on revenue, the highest is green mustard, followed by chili pepper and red chili. While the highest of BEP on price is red chili, followed by green mustard and chili pepper. The study suggests green mustard as the most recommended crop for urban agriculture practice.

**Keywords:** Urban agriculture · Profitability · Vegetable farming · Income · Feasibility

## 1 Introduction

Currently in Indonesia, agriculture began to develop in urban areas. Urban agriculture has a positive potential to increase the food needs and household income of urban communities. The definition of urban agriculture is the activity of growing, processing, marketing and distributing food, forestry and horticultural products found in and around urban areas [1]. Urban agriculture often refers to location (city and/or suburbs), activities (eg for consumption. private or sold). So, the concept of urban agriculture is taken broadly, not only cultivation, but also distribution.

In several major Indonesian cities, for example: Surabaya, urban agriculture is one of the government's programs to help the poor meet their food needs, reduce spending, and at the same time increase family income [2]. Cost reduction is done by consuming your own products so you don't have to buy from the market. Additional family income

is earned when households are able to sell products in the form of seeds, fruits or vegetables. This claim is in line with the results of Rahayu's research [3], which states that urban agriculture generates an additional household income of Rs 344,000.00 per month. Urban agriculture has the potential to provide rural households with a profit of around 2,300,000 IDR–3,200,000 IDR per month [4]. Several regions, such as Surakarta and Yogyakarta, have successfully implemented urban agricultural practices. Most of the urban agriculture concept that is practiced has a R/C feasibility value greater than 1, which means that urban agriculture is feasible with this concept.

The people of the city of Surakarta derive their family income from different livelihoods. Depending on the location and characteristics of the place of residence, they have different patios, whether wide, narrow or without patios. The small agricultural area becomes an obstacle to meeting the demand for agricultural products. To overcome these obstacles, the residents of Surakarta use their gardens to grow vegetables. Given the positive potential of urban agriculture, both to meet family livelihoods and the potential for additional family income, a study of urban agriculture is urgently needed to identify income, earnings and viability of farms. The aims of this study are to (1) estimate the income and profits, and (2) assess the feasibility of vegetable farming in urban agriculture in Surakarta.

## 2 Methods

The basic method used in this research is the descriptive method. The data was generated by 30 respondents. The sampling was specifically conducted in Mojosongo Organic Vegetable Village, Surakarta City, Central Java Province, taking into account the large number of people practicing urban agriculture. Furthermore, this location is the only area that has developed urban agriculture since 2013 without buying cereals from other areas. This area became a producer of crops that were bought by other regions to participate in the urban agricultural development contest.

### 2.1 Estimate Income

The income is the difference between income and all explicit costs in a period considered. Then the statement is formulated as follows (Eq. 1):

$$I = TR - TC \quad (1)$$

where:

- I : Income (Rp)
- TR : Total Revenue (Rp)
- TC : Total Cost (Rp)

### 2.2 Estimate Profit

The profit is the difference between income and all implicit costs in a period considered. The profits can be formulated as follows (Eq. 2):

$$\pi = I - (\text{wages for labor in the family} + \text{rental value of own land} + \text{own capital input}) \tag{2}$$

### 2.3 Estimate Feasibility

The analysis used to determine agricultural viability includes the cost of sales ratio, capital productivity, and breakeven point. The calculation of the analysis of the relationship between revenues and costs uses the relationship between revenues and costs of production. Agriculture can be said to be viable if the R/C ratio is greater than 1. The formula for the R/C ratio [5] is as follows (Eq. 3).

$$R/C = \frac{P_y \cdot Y}{TFC + TVC} \tag{3}$$

where:

- $P_y$  = Input price (Rp)
- $Y$  = Output (Kg)
- $TFC$  = Total fixed cost (Rp)
- $TVC$  = Total variable cost (Rp)

Capital productivity is the ratio of profits to total costs per farm. Agriculture is said to be viable if the value of the productivity of capital is above the current interest rate, while if the value is below the current interest rate, agricultur cannot develop [6]. The productivity of capital can be calculated using the following formula (Eq. 4):

$$\text{Capital productivity} = \frac{\pi}{TC} \tag{4}$$

where:

- $\pi$  : Profit (Rp)
- $TC$  : Total Cost (Rp)

The breakeven point (BEP) is the turning point of a business. The BEP can then indicate at what volume of production and at what price a company is neither profitable nor unprofitable. BEP [6] can be formulated as follows (Eqs. 5–7):

$$\text{Production BEP} = \frac{FC}{P - VC} \tag{5}$$

$$\text{Revenue BEP} = \frac{FC}{1 - \frac{VC}{TR}} \tag{6}$$

**Table 1.** Income and profit average of urban agriculture in Surakarta, 2020

Description	Commodities		
	Red Chili	Chili Pepper	Green Mustard
Per Household			
Revenue (Rp)	760,000	1,168,000	1,227,000
Explicit Cost (Rp)	318,172	466,193	572,084
Income (Rp)	441,828	701,807	654,916
Implicit Cost (Rp)	242,143	274,158	365,939
Profit (Rp)	199,684	427,648	288,978
Per Areal			
Revenue (Rp/m <sup>2</sup> )	1,202,690	1,038,684	2,219,141
Explicit Cost (Rp/m <sup>2</sup> )	503,504	414,578	1,034,665
Income (Rp/m <sup>2</sup> )	699,187	624,106	1,184,476
Implicit Cost (Rp/m <sup>2</sup> )	383,189	243,805	661,834
Profit (Rp/m <sup>2</sup> )	315,998	380,301	522,642

$$\text{Price BEP} = \frac{TC}{Y} \tag{7}$$

where:

- Y : Total Production (kg)
- FC : Fixed Cost (Rp)
- VC : Variable Cost (Rp)
- TC : Total Cost (Rp)
- p : Price (Rp)

### 3 Results and Discussion

#### 3.1 Income and Profit

The income from urban agriculture is the amount of money that is obtained from the production or from the sale of the production, minus the costs explicitly incurred. This amount of money earned is known as a receipt. The income from growing vegetables in Surakarta is different for each product. This income depends on the amount of vegetables produced in a year and the sale price. In Table 1 it can be seen that chili pepper has the highest acceptance compared to green mustard or red chili. This happened because the selling price of chili pepper was higher than that of the other two commodities.

The profit results from the difference between the farm income and the implicit costs. The economically implicit costs are calculated as production costs even if they are not

paid in cash, that is, family labor costs, renting the land itself, and fertilizers. The benefit of growing chili pepper is the highest benefit, while growing red chili and green mustard yields the lowest benefit. This is because family labor costs on the three farms are quite high and do not depend on the volume of production. Mustard greens can generate the highest income and profit among the three commodities.

### 3.2 Feasibility

The feasibility study is the question of whether or not a company or business is being managed [7]. An analysis of the viability of agriculture can be performed by analyzing the R/C ratio, the B/C ratio and the breakeven point (BEP). Table 2 is a comparative table of the viability of growing vegetables in urban agriculture in Surakarta.

According to Table 2, red chili, chili pepper and green mustard are feasible in urban agriculture in the city of Surakarta. These three commodities can be cultivated because the value of the ratio obtained is higher than 1. The R/C ratio of the red chili is 2.30, which means that every time you spend 1 cost unit you will get an income of 2,30; Chili pepper is 2.50, which means that every time you spend 1 cost unit you will get 2.50; and mustard green is worth 2.19, which means you get a revenue of 2.19 for every 1 unit of cost.

Table 2 shows the same performance in  $\pi/C$ , the three commodities, namely: red chili, chili pepper and green mustard, can be grown and developed in urban agriculture in the city of Surakarta. The value of the  $\pi/C$  ratio of the red chili is 0.26, which means that every time you spend 1 unit of cost you will get a profit of 0.26; Chili pepper is 0.55, which means that every time you spend 1 cost unit, you will make a profit of 0.55; and mustard green is worth 0.30, which means that for each unit of cost there is a profit of 0.30.

The breakeven point (BEP) is a point that shows that the total income of a company or company is equal to the costs incurred, so there are no losses or gains. The BEP analysis consists of the production BEP, the sales BEP, and the price BEP. It can be said that agriculture is feasible if the production, yield, price and area of the farm exceed the BEP obtained.

Table 2 shows that red chili, chili pepper and green mustard are feasible in urban agriculture in the city of Surakarta. The BEP value for the production of red chili peppers

**Table 2.** Feasibility of urban agriculture in Surakarta, 2020

Description	Commodities		
	Red Chili	Chili Pepper	Green Mustard
R/C Ratio	2.30	2.50	2.19
$\pi/C$ Ratio	0.26	0.55	0.30
Production BEP (pcs)	27	28	46
Revenue BEP (Rp)	253,792	271,042	349,088
Price BEP (Rp)	5,714	3,573	3,725

is 27; Chili pepper is 28; and mustard greens are worth 46 in a year. The cultivation of the three commodities is considered feasible because the production volume has exceeded the BEP value of its production in one year. The revenues of the three commodities in one year have exceeded the BEP value of the revenues. The BEP value for red chili peppers is Rs 253,334.00; Chili pepper Rp.271.042.00; and mustard green Rs 348,418.00, which means that the farmer will neither gain nor lose if his income reaches this point in one year. Table 2 explains that red chili, chili pepper and green mustard can be grown in urban agriculture in the city of Surakarta. The average sale price of each tree, determined by the surveyed farmers, exceeded the BEP value of the price achieved. The BEP price for red chili is Rs 5,703.00; Chili pepper 3567.00 IDR; and mustard green Rp. 3,718.00, which means that the farmer neither wins nor loses if the product is sold at this price.

## 4 Conclusion and Suggestion

Based on the results of analysis conducted on vegetable farming in urban agriculture in Surakarta, it can be concluded that:

- The income and profits of the three different commodities and the highest to lowest average respectively are chili pepper, green mustard, and red chili.
- Based on the analysis of R/C ratio,  $\pi/C$  ratio and BEP analysis, farming of red chili, chili pepper, and green mustard based on urban agriculture is feasible to be developed and each commodity has differences in the level of feasibility.
- Vegetable farming in urban agriculture can provide additional income in the range of Rp. 400,000.00 to Rp. 700,000.00 per year.

It is better to choose mustard greens for agriculture, because with costs that are not widely separated by 1 m<sup>2</sup>, they can get higher income and income compared to red chili pepper and chili pepper. Red chili and chili pepper plants will generate higher income and income if they are sold in the form of chili crops, so farmers should sell them in the form of chili rather than chili trees.

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