FEASIBILITY ANALYSIS OF HYDROPONIC VEGETABLE FARMING IN ARGA INDAH 1 VILLAGE, PAGAR JATI DISTRICT, BENGKULU CENTRAL DISTRICT WITH DEEP FLOW TECHNIQUE (DFT) SYSTEM

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Abstract

Hydroponic vegetable cultivation can be used as an alternative in increasing income that can be applied at home as an effort to use narrow land. This study aims to find out how much capital is needed in making hydroponic installations measuring 7.5 M x 1.5 M x 1 M and the profits of pakcoy farming in Arga Indah 1 Village, Pagar Jati District, Central Bengkulu Regency using an analysis of calculating farm production costs and farming revenues. with the method of calculating the R/C ratio. The results of the study indicate that the hydroponic vegetable business uses a deep flow technique (DFT) system, which includes planting media, plant installation, nutrition, plant care, and production costs. Based on the results of this study, economically, Pakcoy farming in Arga Indah 1 Village, Pagar Jati District, Central Bengkulu Regency, obtained a profit in each production of IDR 250,680 with an average income of IDR 11,250 per day. Based on the calculation of the R/C ratio, the result is 2.2 which can be concluded that the Packcoy hydroponic farming is feasible to continue.

Keywords: hydroponics, farming, dft, feasibility

1 INTRODUCTION

1.1 Background

Hydroponic vegetable cultivation can be used as an alternative in reminding income that can be applied at home as an effort to use narrow land [5]. According to Masduki [6], hydroponics comes from the Latin hydros which means water and phonos which means work. The literal meaning of hydroponics is water work. Hydroponic farming is then known as planting without a soil medium (soilless cultivation, soilless culture). At first, people planted with the hydroponic method using containers filled with water that had been mixed with micro and macro fertilizers. The advantages of using hydroponics are: Plants are easy to display regardless of land conditions and season, growth and crop quality can be regulated, saves on labor, products are cleaner and more hygienic, planting period is shorter, operational costs are relatively cheap, and save water and fertilizer (safe for environmental sustainability)

Pakcoy (*Barassica rafa*) is included in the mustard plant which is easy to get at an economical price. Plants belonging to the category of vegetables are very beneficial, because they are a source of vitamins, minerals and fiber needed for a healthy body and to improve the quality of human life. Mustard plants are in great demand by the public, especially in Indonesia, because these plants have many benefits, including containing vitamins and minerals. The content of vitamins K, A, C, E and folic acid are very high. Meanwhile, the mineral content in mustard plants, including vitamins and minerals, is also very high [4].

This Pakcoy has just been produced and developed in the village of Arga Indah 1, Pagar Jati district, Central Bengkulu Regency on July 14, 2022. To meet the needs of vegetables, the people of Arga Indah 1 village must buy at the market which is held only once a week and on certain days only, that is, on Tuesdays only. This is a very good business opportunity for the future.

1.2 Research objectives

The purpose of this study was to analyze the advantages and feasibility of hydroponic pakcoy vegetable farming in Arga Indah 1 Village, Pagar Jati District, Central Bengkulu Regency [3].

1.3 Research benefits

As information material for farmers and the community about hydroponic pakcoy vegetable farming methods that can be developed on narrow land or yards and information and reference material for farmers in business development [3].

2 METHODOLOGY

The research was carried out in Arga Indah 1 Village, Pagar Jati District, Central Bengkulu Regency, Bengkulu Province. Data collection was carried out from July to August 2022 for the manager of the hydroponic installation which happened to be the manager myself. The method used is an analysis of the calculation of farm production costs and pakcoy farm revenues with the R/C ratio calculation method [1].

2.1 Fixed costs

Fixed costs are costs that do not run out in one production process. Included in the fixed costs are the depreciation costs of farming hydroponic installation equipment in the form of paralon pipes, installation tables, netpots, seedling trays, and others.

2.2 Variable costs

Variable costs are costs that are used up in one production process. Included in the variable costs are the costs of production facilities, such as Packcoy seeds, rockwool, ABmix nutrition, and others.

2.3 Total cost

Total cost is the sum of fixed costs and variable costs. Total cost formula is in Equation (1), where TC=Total Cost, FC= Fixed Cost, VC= Variable Cost.

$$TC = FC + VC \quad (1)$$

2.4 Farming revenue

Farming revenue is the total income received by farmers from production activities carried out and has generated money that has not been deducted by costs incurred during one production. Farming revenue is calculated by Equation (2), where TR=Total Revenue (Pakcoy Revenue), p=Pakcoy price per 1 stick, q=Total Harvest Pakcoy/stem.

$$TR = p \, x \, q \quad (2)$$

2.5 Farming profits

Profit is the difference between revenue and production costs.
Farm profit formula is in Equation (3), where TR= reception, TC= total cost.

$$II = TR - TC \quad (3)$$

2.6 R/C ratio

R/C Ratio is an analysis used to determine the relative advantage of farming. The R/C Ratio can be searched by using a comparison between revenue and production costs incurred. The R/C ratio is a feasibility analysis, which is an assessment of the extent to which the benefits derived from a business activity are intended as a business consideration that can be continued or not. R/C ratio can be calculated by Equation (4).

$$\text{R/C ratio} = \frac{(\text{revenue})}{(\text{total cost})} \quad (4)$$

Notes:

- If the R/C Ratio > 1, the revenue received is greater than the costs incurred, meaning that the business is feasible to continue running.
- If the R/C Ratio < 1 then the revenue received is smaller than the costs incurred, meaning that the business is not feasible to continue running.
- If the business activity produces R/C Ratio = 1 then the business is in normal profit.

2.7 Average farm income

The average income is the result of the receipt of farming results divided by the planting period of the pakcoy plant.

3 RESULTS

This study aims to determine how much capital is needed in making hydroponic installations measuring 7.5 M x 1.5 M x 1 M and the profit of pakcoy farming in Arga Indah 1 Village, Pagar Jati District, Central Bengkulu Regency using analysis of calculating farm production costs and pakcoy farming revenues. with the method of calculating the R/C ratio. In this hydroponics system using a deep flow technique (DFT), which includes planting media, plant installation, nutrition, plant care, and production costs [2].

3.1. Calculation of Farm Production Costs

3.1.1 Cost capital

The hydroponic system used in this farming research uses a deep flow technique (DFT) system measuring 7.5 M x 1.5 M x 1 M. Following are the details of the materials used:

Table 1. *Table of costs for making hydroponic installations*:

Number of Item	Name	Price	Quantity
10	3 inch vinyl pipe D	145.000	1.450.000
4	Taso pole size 75x75	140.000	560.000
7	Mast battens	69.000	483.000
4	Vinyl pipe ½ inch	30.000	120.000
1	1 inch vinylon pipe	60.000	60.000
10	Cap 3 inch hubcap	15.000	150.000
1	Waring 70 m	260.000	260.000
300	Channel bolt	250	75.000
2	Caps 1 inch	7.000	14.000
2	Caps ½ inch	1.500	3.000
1	T ½ inch	4.700	4.700
1	Derivative 1x ½ inch	3.700	3.700

1	T 1inch	8.500	8.500
9	L ½ inch	3.000	27.000
1	L 1 inch	6.500	6.500
10	Nepel 7 mm thread	500	5.000
3	Hose 7 mm	2.500	7.500
1	Pump Aquila P3800	182.000	182.000
	Total		**IDR 3.419.900**

Table 2. *Table of tools and materials costs.*

Number of Item	Name	Price	Quantity
3	Glue isorplus	10.000	30.000
1	Pipe insulation	2.800	2.800
1	Elbow craftsman	23.000	23.000
1	Steel shears	57.000	57.000
1	Drilling machine	406.000	406.000
1	Channel bolt drill bit	10.000	10.000
1	iron drill bit	7.500	7.500
1	waterpass	27.000	27.000
¼ kg	nails	6.000	6.000
3	Seedling tray mat	13.000	39.000
1	Ph meter	60.000	60.000
1	Pakcoy Seed	11.000	11.000
1	Measuring cup 1 liter	18.000	18.000
1	Hole saw 13 pcs	40.000	40.000
200	5 cm hydroponic netpot	350	70.000
1	Ab mix concentrated 5 liter	77.000	77.000
1	Rokwool cultilene	65.000	65.000
1	Tds meter	33.000	33.000
	Total		**IDR 982.300**

3.2. Calculation of R/C ratio

Calculation analysis used is the cost of farming production and pakcoy farming revenue with the calculation method of R/C ratio [1].

2.2.1 Fixed costs

Fixed costs are costs that do not run out in one production process which include: installation table, seedling tray mat, measuring cup, waring, pump, and hydroponic netpot (Nova and Endo, 2020). Fixed costs incurred amounted to Rp 3,546,900. If it is assumed that these materials can last for 5 years, then the fixed costs will be refunded for 5 years at the amount of IDR 709,380 per year. One hydroponic period takes 40 days from sowing seeds to harvesting vegetables. That way, if it is calculated in one year, it has 9 planting periods. if you want to pay for fixed costs per period, the amount of fixed costs per period is Rp. 78,820.

2.2.2 Variable costs

Variable costs are costs that are used up in one production process which include: Packcoy seeds, rockwool, and ABmix nutrients (Nova and Endo, 2020). For rockwool it can be used for two productions, so that in one production it is enough with half the rockwool. The costs incurred are Rp. 120.500.

2.2.3 Total cost

Total cost is the sum of fixed costs and variable costs.

Total cost formula:

TC = FC + VC

= 78.820 + 120.500

= 199.320

2.2.4 Farming revenue

Farming revenue is the total income received by farmers from production activities carried out and has generated money that has not been deducted by costs incurred during one production. In the installation there are 180 planting holes, and if sold the price per stem is IDR 2.500.

TR = p x q

= 2.500 x 180
= 450.000

2.2.5 Farming profit

Profit is the difference between revenue and production costs.

II = TR – TC
= 450.000 – 199.320
= 250.680

2.2.6 RC/ratio

R/C Ratio is an analysis used to determine the relative advantage of farming. The R/C Ratio can be searched by using a comparison between revenue and production costs incurred. The R/C ratio is a feasibility analysis, which is an assessment of the extent to which the benefits derived from a business activity are intended as a business consideration that can be continued or not.

$$\text{R/C ratio} = \frac{\text{revenue (revenue)}}{\text{Cost (total cost)}}$$
$$= \frac{450.000}{199.320}$$
$$= 2,257$$

So, the RC/ratio obtained is 2.2.

If the R/C Ratio > 1, the revenue received is greater than the costs incurred, meaning that the business is feasible to continue running.

2.2.7 Average farm income

In one production, it requires a period of seedling to transplanting until it is time to harvest approximately 40 days. And the farm income earned is IDR 450.000. Thus, the average farm income is:

$$m = \frac{\text{farm revenue}}{\text{planting period}}$$
$$= \frac{450,000}{40}$$
$$= 11.250$$

So, the average daily farm income is IDR 11.250.

2.3 Deep Flow Technique (DFT) System

According to Ekaria [2], several elements that must be considered in cultivating vegetables with the deep flow technique hydroponic system are as follows:

2.3.1 Growing media

The planting medium used in this farming is rokwool, as a medium for seedlings and growing pakcoy plants. The shape of the skirt is like a cube with a size of 2.5 cm x 2.5 cm x 2.5 cm. (Renna et al. 2020)

2.3.2 Plant installation

The installation used in this Pakcoy farm uses a deep flow technique (DFT) system with materials such as mild steel poles, mild steel battens, pipes, etc. The size of this plant installation is 7.5 M x 1.5 M x 1 M with a total of 180 planting holes.

2.3.3 Nutrition

The nutrients used are ABMix in the form of powder mixed into 5 liters of clean water and dissolved until well mixed. Its use is by mixing the ABMix solution in a nutrient water reservoir with a concentration between 800-1300 ppm.

2.3.4 Pakcoy plant care

Pakcoy plant care begins with checking the nutrient content in the water reservoir, cleaning the nutrient water reservoir and pipes after harvesting and selecting plants contaminated by disease so they don't spread to other plants.

2.3.5 Production cost

In one production, costs are required to purchase pakcoy seeds, rockwool, and ABmix nutrients. For rockwool it can be used for two productions, so that in one production it is enough with half the rockwool. The cost required is Rp. 120,500.

4 CONCLUSION

Pakcoy hydroponic vegetable farming in Arga Indah 1 village, Pagar Jati district, Bengkulu Regency is currently implementing a deep flow technique (DFT) system with a size of 7.5 m x 1.5 m x 1 m requires a manufacturing cost of IDR 3,546,900 with a total planting hole of 180

holes. The costs incurred for one planting period are Rp. 120,500 for the purchase of pakcoy seeds, rockwool and hydroponic nutrients. Based on the farming analysis, hydroponic vegetable cultivation with the DFT system is feasible with an R/C ratio of 2.2.

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