



Small-Scale Agribusiness Lemon: How is the Economics Feasibility?

(Case Study in Banyumas Regency, Central Java)

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Abstract. Since 2013, California lemons have been grown in Banyumas Regency. Currently, Banyumas Regency has 12 ha of lemon planting space with 6,550 plants. California lemon growing is a privately held enterprise in Banyumas Regency. However, California lemon farmers in Banyumas Regency have collaborated with PT. Cilengko Lentera Al Barokah for the procurement of plant seeds and the sale of crops. However, there are still problems experienced by lemon farmers with partners, including the weak bargaining power of farmers with partners and the lack of transparency in the grading process. These conditions affect the income and sustainability of farmers' lemon agribusiness. Therefore, this study aims to determine the feasibility of the California lemon business in Banyumas Regency. The methods used are NPV analysis, Net B/C ratio, IRR, and payback period (PP). The respondents of this study are lemon farmers in the Banyumas area and have partnered with PT. Cilengko Lentera Al Barokah. Through this research, it can be known the feasibility of lemon agribusiness and can be used as a consideration for farmers or other stakeholders to enter lemon agribusiness. The analysis results show that lemon agribusiness in Banyumas Regency is worthy of effort and benefits farmers.

Keywords: lemon · economic feasibility · revenue

1 Introduction

California lemon farming has been going on in Banyumas Regency since 2013. The lemon planting area in Banyumas Regency is currently 12 ha, with 6,550 plants. California lemon farming is a sole proprietorship in Banyumas. However, California lemon farmers in Banyumas Regency have collaborated with PT Cilengko Lentera Al Barokah to procure plant seeds and sell their crops. This collaboration has been going on for a long time, but there is no good cooperation document yet. There are several advantages and disadvantages that farmers get from this cooperation. The advantage of this collaboration is that farmers are guaranteed to market their products. Marketing cooperation carried out by farmers with these companies does not apply to the entire product produced, meaning that farmers can sell their products to other parties, including retailers and end consumers. However, the number of transactions between retailers and final consumers is less than those made by farmers with partner companies.

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S. B. Sulistyono et al. (Eds.): ICSARD 2022, ABR 30, pp. 33–41, 2023.

https://doi.org/10.2991/978-94-6463-128-9_5

The drawback of cooperation is that farmers do not have strong bargaining power. The company determines the price, while the farmers are only the price takers. Besides that, sometimes problems arise, perception as differences in the perception of lemon grade determination, as well as differences in weighing the weight of the fruit at the plantation location with the company. These various problems are disturbing to farmers, but because they do not have strong bargaining power, farmers can only accept these conditions. Considering that lemon marketing activities cannot be carried out individually, even though farmers can sell to retailers and consumers, the amount of fruit sold to these parties is not too much. Hence, farmers' sales are highly dependent on sales to partner companies.

California lemon farming requires a significant investment. The investments made by farmers include land rent, purchase of plant seeds, purchase of fertilizers, assets of pesticides, and labor costs. A business that requires a significant enough investment requires careful calculations related to the feasibility of its business. A business feasibility assessment is needed to see future business developments, including to find out the business profits obtained, to know the process of returning the capital that has been issued, and to see the level of business sensitivity to the risks that must be faced in the business. Business feasibility analysis aims to determine whether or not a business is feasible [1–3]; feasibility also means that it can benefit entrepreneurs, investors, creditors, the government, and the wider community [4]. The success of developing a commodity is determined by the income and the efficiency level of the farmer's income. Items grown, in this case, lemon, must be able to provide benefits and can develop by considering external factors. In other words, farmers plant and develop lemon citrus farming if income is profitable [5]. Income is one of the economic aspects of agriculture which can be in the form of receipts worth money or goods. Income has a close relationship with the level of production achieved; if production increases, farmers' income tends to grow, and the amount of farmers' income depends on the overall price level. The income level is influenced by land area, labor, production costs, and farmers' education level [6].

2 Research Method

The research was carried out in the Banyumas Regency area and was carried out from April 2022 to July 2022. The data analysis method used was descriptive statistical analysis. This analysis is a procedure for compiling and presenting the data that has been collected. The processed form of the raw data from descriptive statistical analysis is the frequency distribution table (frequency list), graphic images, the size of the concentration, and the size of the spread [7]. Another analysis used is quantitative analysis. According to [8], quantitative analysis was carried out for business feasibility assessment. The measurement of business feasibility is carried out through analysis using the Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and Payback Period (PP) methods [9]. The method of determining respondents was the census method, meaning that all farmers were used as respondents in this study [10]. If the total population is less than 100 people, then the total number of samples is taken [11].

To see the success of farmers in managing their farming business is the increase in income obtained from their farming activities. This income analysis is helpful for

farmers as well as for owners of factors of production. There are two main objectives of income analysis: to describe the current state of business activity and the future state of planning or action. For a farmer, income analysis measures whether or not his everyday business activities are successful.

The analysis of lemon farming income consists of two parts: the state of payment and the state of expenditure during the farming business for eight years. The revenue earned from the total product is multiplied by the selling price at the farm level. The formula for farming income is as follows:

$$\begin{aligned} TR &= P_y \times Q_y \\ TC &= TFC + TVC \\ \pi &= TR - TC \end{aligned} \quad (1)$$

where:

- π = profit (Rp)
- P_y = output price (Rp)
- Q_y = total output (Kg)
- TR = total revenue (Rp)
- TC = total cost (Rp)
- TFC = total fixed cost (Rp)
- TVC = total variable cost (Rp)

An analysis is carried out from the financial aspect to see the overall investment owned by farmers in lemon farming activities. The investment feasibility criteria from the financial part of lemon farming are seen from the values of NPV, IRR, B/C Ratio, and Payback Period (PP). The use of these criteria in determining the feasibility level of lemon farmers' farming is an effort to see the state of the business and its group of ability in dynamic conditions for the value of the investment invested by farmers to generate profits so that it is feasible or not to be developed. The analysis was carried out with an interest rate of 5.25 percent. The 5.25 percent interest rate is the bank deposit interest rate in 2022. The reason for choosing the 5.25 percent interest rate is that it is assumed that farmers are faced with whether to invest the money in a lemon farming project or a bank.

The Net Present Value (NVP) method calculates the difference between revenues and costs to the number of interest rates or an analysis considering the discount factor at a specific time. The discount rate used is the deposit interest rate that investors must pay. The project feasibility study's current value is when the project is completed. According to Nuralina et al., 2011 [12], how to calculate NPV is as follows:

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1+r)^t} \quad (2)$$

where:

- B_t = revenue in year t per hectare per year
- C_t = expenses in year t per hectare per year
- r = social discount rate. In this calculation, the number 5.25 percent per year is used
- n = the project's economic life in the measure is used for five years.

There are three investment eligibility criteria for NPV, namely, if $NVP > 0$, then the project is profitable and feasible to implement, and if $NVP < 0$, then this project is detrimental because the profit is smaller than the cost, so it is better not to implement it. If $NVP = 0$, then the project does not profit but also does not lose, so it depends on the subjective judgment of the decision maker.

Internal Rate of Return (IRR) is the discount rate that produces NVP equal to 0. IRR is the average annual rate of internal profit for companies that make investments and is expressed in percent. The resulting quantity in this calculation is in percent. A project or investment activity is said to be feasible if the IRR value is more than the specified discount rate. On the other hand, if the IRR is less than the discount rate, the project is not feasible to implement. The formula for calculating IRR is as follows:

$$IRR = i_{itr} + \frac{NPV_{itr}}{NPV_{itr} - NPV_{itt}} \times \Delta i \quad (3)$$

where:

i_{itr} = lowest interest rate

Δi = difference between highest and lowest capital interest

NPV_{itr} = calculation of NPV with the lowest interest

NPV_{itt} = calculation of NPV with the highest interest

The B/C Ratio is the ratio between the benefit stream's present value and the cost stream's present value. The criteria for selecting the B/C ratio measure of benefits is to select all projects whose B/C ratio value is one or more or if the flow of benefits and costs are discounted at the level of the opportunity cost of capital. Mathematically the formula used in calculating the B/C ratio can be stated as follows:

$$\frac{B}{C} \text{ ratio} = \frac{\sum_{t=1}^n B_n(1+i)^n}{\sum_{t=1}^n C_n(1+i)^n} \quad (4)$$

where:

B_n = benefits at the nth time

C_n = costs at the nth time

i = the interest rate of 5.25 percent

n = time for five years

t = time

The payback period is the period farmers need to pay back all the costs incurred to invest in lemon farming. The following formula can calculate the payback period (PP):

$$PP = T_{p-1} + \frac{\sum_{i=1}^n I_i \sum_{i=1}^n B_{icp-1}}{B_p} \quad (5)$$

Note:

T_{p-1} = The year before there is a payback period

I_i = amount of investment that has been discounted

B_{icp-1} = amount of benefits that have been overlooked before the payback period

B_p = amount of advantages in the payback period

Table 1. Initial investment cost of lemon farming per hectare (in thousands)

No.	Fee Type	Unit	Price/unit (Rp)	amount	Value (Rp.)
1.	Seedling	stem	10	0.6	6,000
2.	Manure fertilizer	kg	1	5	5,000
3.	Equipment				
	Bamboo	pcs	10	0.6	6,000
	Ropes	kg	20	0.05	1,000
	Scissors	Pcs	30	0.003	90
	Sprayer tank	Pcs	350	0.001	350
	Pipe/hose	meters	6	0.05	300
Total			18,740		

According to Soekartawi, 1995 [13], the formula for calculating the payback period is as follows:

$$PP = \text{cumulative year} + \left(\frac{\text{cumulative value} - \text{initial investment}}{\text{cumulative income}} \times 1 \text{ years} \right) \quad (6)$$

3 Result and Discussion

The cost of lemon farming includes all expenses needed to finance lemon farming in Banyumas Regency during the economic life of the plant, which is eight years. This type of cost in this study is divided into two: investment costs and production costs. Investment is the use of resources for production activities that are expected to generate income in the future. The initial investment costs of lemon farming in detail can be seen in Table 1.

Based on the data in Table 1, it is known that the total initial investment cost for lemon farming in Banyumas Regency is Rp. 18.740.000. The highest investment cost for purchasing bamboo and seedling equipment is about Rp. 12.000.000. These two materials are used to make stakes, and the equipment purchase is also quite large, around 90% of the total investment cost.

Production costs are all types of costs that must be incurred for the needs of lemon cultivation every year for five years [14]. Production costs are divided into two types, namely fixed costs and variable costs. Fixed costs in wine farming include land rental costs and equipment depreciation costs. In contrast, variable costs are costs incurred by the company (producer) where the size depends on the number of products produced. Variable costs in lemon farming include fertilizer, medicine, and labor costs. Fertilizer costs include manure and artificial (chemical) fertilizers. Details of the average production cost per year in lemon farming in Banyumas Regency can be seen in Table 2. The average production cost required in lemon farming is Rp. 16.350.000/Ha/year, consisting of fixed costs of Rp.3,975,000.00 and variable costs of Rp. 12,375,000,00.

Table 2. Average production cost/ha/year in lemon farming in Banyumas Regency

No.	Description	Amount (Rp)
A.	Fixed Cost	
1.	Rent land cost	3,500,000
2.	Equipment depreciation cost	475,000
B.	Variable Cost	
1.	Fertilizer	1,200,000
2.	Pesticide	950,000
3.	Farm worker	
	Planting hole	550,000
	Planting	375,000
	Pruning	300,000
	Fertilization	700,000
	Pest management	1,500,000
	Pruning and thinning	1,500,000
	Harvest	5,300,000
Total Cost		16,350,000

Lemon farming revenue is the multiplication of the number of lemons produced (kg) with the price of lemons (Rp/kg) prevailing in the Banyumas Regency. In comparison, income is defined farming as the difference resulting from the amount of revenue from the resulting output minus the total costs incurred in farming. The acceptance of the first lemon farming occurred in the 1st year, but the results have not been so much. Lemon plants can produce crops in eight months, but the first harvest is usually not too much. This is due to less-than-optimal thinning, improper maintenance, to natural factors (continuous rain). In the first year, lemon plants are susceptible to these factors.

Farming revenue is obtained by multiplying the total production of lemons by the selling price. The selling price of lemons at the farmer level ranges from Rp. 5,000 to Rp. 7,500/kg, depending on the quality of the harvest. The amount of farmers' income from lemon farming per Ha per year is shown in Table 3.

Based on the Table 3, it is known that the total production cost needed in lemon farming during its economic life (5 years) is Rp. 80.600.000, so the average cost incurred is Rp. 13.433.333/Ha/year. From the revenue side, it is known that the total revenue can be obtained is Rp. 392.500.000 per hectare. If, on average, the farmer's income is Rp. 78.500.000/Ha/year from lemon farming. Based on the cost and revenue data, lemon farming income for five years was Rp. 311.900.000. From a lemon farming area of 1 ha, the average farmer's income/profit is Rp. 51.983.333/year. Such an annual income shows that lemon farming is profitable.

Table 3. Lemon Farming Income in Banyumas Regency (per Ha)

Year	Cost (Rp)	Income (Rp)	Revenue(Rp)
0	29,000,000	0	-29,000,000
1	10,500,000	72,000,000	61,500,000
2	11,300,000	81,000,000	69,700,000
3	12,200,000	90,000,000	77,800,000
4	9,300,000	76,000,000	66,700,000
5	8,300,000	73,500,000	65,200,000
Total	80,600,000	392,500,000	311,900,000
avg	13,433,333	78,500,000	51,983,333

Table 4. Analysis of financial feasibility of lemon farming (per Ha) in Banyumas Regency

Eligibility Criteria	Value	Conclusion
Net B/C	1,84	feasible
NPV	57.239.152	feasible
IRR	36%	feasible
Payback Period	4,4	feasible

In an annual business like lemon farming, a feasibility analysis can be carried out using investment criteria analysis tools, including NPV (Net Present Value), IRR (Internal Rate of Return), and Net B/C. The NPV, IRR, and Net B/C calculation results show the value that will be received in the future, which is calculated by multiplying the present value by the discount factor (discount factor). At the same time, the payback period analysis is carried out to determine the payback period for investment. The interest rate prevailing in the research area is assumed to be the prevailing interest rate at the time of the research was 14%.

The data in Table 4 shows that at an interest rate of 14% per year, lemon farming in Banyumas Regency is feasible for further cultivation because it has a Net B/C value of 1,84 at a bank interest rate of 14%. Net B/C is a comparison between costs and revenues multiplied by the discount factor, where a business is feasible to develop if the Net B/C value is more than one. The results of the calculation of Net B/C in this farming analysis yield a value of 1,84, so farming is feasible to develop. This value means that every Rp. 1.00 investment issued by farmers can increase Rp's profit (net benefit) 1,84. The greater the Net B/C worth, the more profitable a business.

In addition, this farm is said to be feasible because it meets other investment criteria, namely having a positive NPV value ($NPV > 0$). The NPV value shows the level of profit of farmers in lemon farming if the business runs for five years which is calculated using the present value and the current interest rate. The results of the NPV calculation

with an interest rate of 14% produce an NPV of Rp. 57.239.152. This value indicates a positive NPV, so it can be concluded that lemon farming is feasible to develop.

According to other investment criteria, lemon farming has an IRR value of 36%, higher than the prevailing interest rate of 14%. The IRR value shows the value of the interest rate when $NPV = 0$, meaning that the business condition is neither profitable nor losing [12]. Calculating the IRR of lemon farming is done manually through experiments at various interest rates to produce an NPV value of zero or negative, so an IRR value of 36% is obtained. That is, until the interest rate of 36% ($NPV = 0$), lemon farming is still feasible. The value of $IRR > i$ (applicable interest rate) indicates that investing capital for lemon farming is more profitable than depositing it in a bank, provided that this farming is managed as optimally as possible.

Next is the calculation of the payback period for lemon farming in Banyumas Regency; it is known that the payback period for investment in lemon farming is four years and four months. These results indicate that at an interest rate of 14%, this lemon farming is still feasible to develop because the payback period does not exceed the lemons' five-year economic life.

4 Conclusion

Analysis of the production costs, revenues, and income of lemon farming in Banyumas Regency shows that lemon farming is considered feasible because it is profitable, and the results obtained: the average production cost is Rp. 13.433.333/Ha/year; average farm income Rp. 78.500.000/Ha/year; and the average revenue of farmers is Rp. 51.983.333/Ha/year. Financial analysis of lemon farming in Banyumas Regency at a bank interest rate of 14%, shows that lemon farming is considered feasible because it obtained: Net B/C value of 1.84; NPV of Rp. 57.239.152; IRR of 36%; and a payback period of 4 years and 4 months.

Acknowledgments. We would like to thank LPPM Jenderal Soedirman University for providing research funding. This research is part of the funding for excellent basic research (RDU) at Jenderal Soedirman University in 2022 entitled "Strategi Pengembangan Lemon California di Kabupaten Banyumas."

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