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Analysis of Farming Businesses Producing Vermicompost Based on Earthworms as an Alternative Source of Income for Farmers

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Abstract---This study aims to analyze the feasibility of vermicompost production based on earthworms as an alternative source of income for farmers. The research was conducted in Bunutin Village using cost, revenue, profit, and R/C ratio analysis methods. The results show that the total production cost per six-month cycle is IDR 3,644,164 with a gross income of IDR 4,423,812.50, resulting in a net profit of IDR 779,648.5. The R/C ratio of 1.21 and a payback period of eight months indicate that the business is financially feasible. This business has the potential to increase farmers' income through the sale of worms and vermicompost, although feed cost efficiency needs to be improved to increase profits.

Keywords---Vermicompost, Earthworms, Business feasibility, R/C ratio, Farmers' income.

Introduction

The economic resilience of farmers in Indonesia is often disrupted by fluctuations in crop prices, high production costs, and dependence on expensive and environmentally unfriendly chemical fertilizers. The search for sustainable alternative sources of income has encouraged the development of vermicompost-based farming businesses, which produce organic fertilizer from the decomposition of organic waste by earthworms such as *Lumbricus rubellus* (Tedesco et al., 2019).

Vermicompost has been proven to increase soil fertility and crop yields, as well as improve soil health ecologically (Fonte et al., 2023). In addition, this activity is considered very suitable to be developed as a household-scale agribusiness because it is easy to implement and utilizes local organic waste (Thirunavukkarasu et al., 2022; Susanti & Pratiwi, 2021).

From an economic perspective, research shows that vermicomposting has a positive B/C ratio (>1), meaning it is financially viable (Tarisa et al., 2024). In some areas, such as Malang and Madiun, this activity has become a source of additional weekly income for farmers with competitive earnings (Akhiroh et al., 2022).

In the context of the circular economy and environmentally friendly agriculture, earthworms are also used in the bioconversion of hazardous waste into high-nutrient compost (Charan et al., 2024). In fact, according to a meta-analysis by Van Groenigen et al. (2015), the presence of earthworms can increase crop productivity by up to 25% (Van Groenigen et al., 2015).

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However, the sustainability of this business is highly dependent on financial management, market access, and policy support. Therefore, farm business analysis is an important tool for evaluating the economic feasibility and income contribution of vermicomposting businesses to farmers' welfare (Vogel, 2012). Therefore, it is important to systematically evaluate the feasibility of vermicompost farming so that the results can be used as a basis for developing small and medium enterprises, empowering farmers, and strengthening the agroecology-based economy (Singh & Sinha, 2022).

Research Method

This research was conducted at the Dukuh Gangga Sedana Pokdakan in Bunutin Village, Bangli District, Bangli Regency. The data analysis methods used were as follows:

a. Production costs:

Costs consist of fixed costs and variable costs.

$$TBP = TBT + TBTT$$

Explanation :

TBP= Total production costs/*Total biaya produksi*

TBT= Total fixed costs/*Total biaya tetap*

TBTT= Total variable costs/*Total biaya tidak tetap*

b. Revenue

Farm revenue can be calculated using the following formula:

$$TR = Py \times Y$$

Explanation :

TR = Total farm income/*Total penerimaan usahatani*

Py = Price of Y/*Harga Y*

Y = Production obtained from farming (Soekartawi, 1986)/ *Produksi yang diperoleh dalam usahatani (Soekartawi, 1986)*

c. Profit

Mathematically, the formula for calculating profit is:

$$\Pi = TR - TC$$

Explanation:

Π = Farming profit

TR = Total Revenue

TC = Total Cost of farming (Soekartawi, 1986)

Criteria: If the profit value is positive, it is profitable. Conversely, if the profit value is negative, it is a loss.

d. According to Suratiyah (2006), the feasibility analysis of farming in terms of profit uses the following formula:

$$\frac{R}{C} \text{ Rasio } \frac{TR}{TC}$$

Explanation:

TR = Total Revenue

TC = Total Cost

With these criteria, if:

R/C Ratio > 1, vermicompost farming is feasible.

R/C Ratio = 1, vermicompost farming is break-even.

R/C Ratio < 1, vermicompost farming is not feasible.

Discussion

The results of the analysis of vermicompost production based on earthworm cultivation show that the total production cost for one 6-month cycle is IDR 3,644,164. These costs consist of container depreciation costs (IDR 116,664), the purchase of 5 kg of worm seeds (IDR 475,000), feed costs from a combination of cow manure and straw (IDR 2,812,500), and organic waste (IDR 240,000). Feed costs are the largest expense in the cost structure, accounting for approximately 82.6% of total production costs, so feed procurement efficiency will greatly affect business profitability (Dominguez & Edwards, 2011; Parolini et al., 2020).

Capital costs

- a. Worm farming = IDR 700,000
- b. Worm seeds = IDR 475,000 / 5 kg
- c. Feed:
 - Cow manure = IDR 5,000/kg
 - Straw = IDR 5,000/kg
 - Organic waste = IDR 5,000/kg

Table 1
Total Production Costs for 6 months

Components	Costs (IDR)
Container depreciation (6 months)	19.444 × 6 = 116.664
Worm seeds	475.000
Feed (cow manure + straw)	2.812.500
Organic waste	240.000
Total cost	3.644.164

In terms of revenue, this business produces two main products, namely earthworms and vermicompost. At the end of the cycle, earthworm production is estimated to reach 20 kg with a selling price of IDR 49,000/kg, generating

revenue of IDR 980,000. Meanwhile, vermicompost production reaches 281.25 kg with a selling price of IDR 12,250/kg, generating revenue of IDR 3,443,812.50. Thus, the total gross income per cycle is IDR 4,423,812.50. These results are in line with findings that earthworm farming can generate two sources of income simultaneously, from earthworm biomass and organic fertilizer, which can increase the economic value of organic waste (Edwards et al., 2010; Damianos & Skuras, 1996).

Table 2
Total Gross

Products	Volume	Price/kg	Revenue (IDR)
Worm	20 kg	49.000	980.000
Vermicompost	281,25 kg	12.250	3.443.812,50
Total			4.423.812,50

Profit = 4.423.812,50 – 3.644.164 = IDR 779.648,5

The difference between gross income and total production costs results in a net profit of IDR 779,648 per cycle. This value shows that on a business scale with 5 kg of worm seeds and a container area of 2×1 m, the business can still be profitable, even though the margin obtained is moderate (Soekartawi, 2002).

Table 3
Eligibility

Cycles/year	Revenue (IDR)	Price (IDR)	Nett (IDR)	R/C Ratio
2 (6 months)	8.847.625	7.288.328	1.559.297	1,21

From the feasibility analysis, if the business is run for 1 year with 2 harvest cycles, the total gross income will reach IDR 8,847,625, and the total cost will be IDR 7,288,328, resulting in an annual net profit of IDR 1,559,297. The R/C ratio of 1.21 indicates that every IDR 1.00 spent can generate IDR 1.21 in revenue, which means that this business is financially feasible (Soekartawi, 2002). However, this result still takes into account the condition where labour costs are not included in cash because the work is done by the owner. Small-scale businesses are prone to inefficiency when labour costs are high, unless there are savings in inputs or an increase in the selling price of products (Gittinger, 1986).

Conclusion

Based on the research results, it can be concluded that the earthworm-based vermicompost production farming business in Bunutin Village is financially viable. With a total production cost of IDR 3,644,164 per cycle (6 months) and gross income of IDR 4,423,812.50, this business generates a net profit of IDR 779,648.5. If two cycles are carried out per year, the annual profit reaches IDR 1,559,297 with an R/C ratio of 1.21. These results show that every IDR 1 of cost generates IDR 1.21 in revenue. The success of this business is supported by the dual potential of earthworm and vermicompost sales, although feed cost efficiency and business scale management remain important factors in increasing profitability.

Suggestion

Based on the research results, it is recommended that vermicompost farmers based on earthworms improve feed cost efficiency, considering that this component accounts for approximately 82.6% of total production costs. This can be achieved, for example, by utilizing local organic waste for free or collaborating with local livestock farmers. In addition, increasing the scale of the business by adding more containers and increasing the volume of worm seeds can be a strategy to increase income. Product diversification is also necessary, such as developing small-packaged organic fertilizers, liquid worm extracts, or fish feed made from worm meal to reach a wider market segment. From a marketing perspective, the use of social media, marketplaces, and agricultural community networks is essential to expand consumer reach. Finally, training and mentoring in business management, efficient cultivation techniques, and organic product innovation are key to improving the sustainability and profitability of the business.

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