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THE BIOSAKA EFFICIENCY IN SUPPORTING INCOME FROM HYDROPONIC VEGETABLE CULTIVATION BUSINESS

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ABSTRACT

Conventional hydroponics faces nutrient efficiency challenges, impacting profitability and business sustainability. This study is important because it attempts to address these issues through a more economical integration of AB-Mix and Biosaka. This study aims to evaluate the economic efficiency of AB-Mix 37.5% and Biosaka 62.5% compared to the 100% AB-Mix method in hydroponic cultivation. This study uses a case study method at Eco-Hydro, conducted in February–June 2024 in a small hydroponic facility with 400 planting holes. Data were collected through field observations and interviews with 10 hydroponic business actors in Limapuluh Kota Regency. Quantitative analysis includes the calculation of the R/C Ratio and cash flow projections for three years. The results show that the combination of AB-Mix and Biosaka produces an R/C Ratio of 1.4, compared to 1.02 in the 100% AB-Mix method. The net profit per period reached IDR366,219 for the combination of AB-Mix and Biosaka, much higher than IDR24,136 in the 100% AB-Mix method. Cash flow projections show a cumulative income of IDR8,428,896 in three years, confirming the superior economic efficiency of this combination method.

Keywords: AB-mix; biosaka; financial projection; hydroponics; R/C ratio.

INTRODUCTION

Research on the efficiency of nutrient use in hydroponic cultivation is essential to increase the productivity and sustainability of modern agriculture. According to Agustian et al. (2022), an integrated nutrient management system can optimize plant growth and nutrient use efficiency in hydroponic systems. Eco-Hydro is a hydroponic vegetable startup brand in Limapuluh Kota Regency, West Sumatra Province, that has supported an integrated nutrient management system. Eco-Hydro focuses on environmentally friendly cultivation using a hydroponic system that uses additional organic materials, namely biosaka, as a nutrient solution that can reduce the use of Ab-mix chemicals. This hydroponic vegetable cultivation business idea was founded in response to the increasing interest of people who care about health and the high demand for vegetables in Limapuluh Kota Regency, West Sumatra Province. Data from the Food Crops, Horticulture, and Plantation Service of West Sumatra Province (2023) shows that in the last three years from 2020-2023, the demand for fruits and vegetables in Limapuluh Kota Regency reached 102,731.10 tons per year, which shows that the trend of vegetables is indeed increasing.

The increasing demand for vegetables is still a problem because the availability of vegetables given to consumers is still conventional with the use of chemicals. According to Soleh (2022), consuming chemical-containing vegetables adversely affects the environment and human health, such as cancer, congenital disabilities, nerve damage, or genetic mutations. In addition, conventional, non-environmentally friendly agricultural practices using chemicals can also reduce soil fertility and threaten the sustainability of agricultural land, thus accelerating the loss of soil fertility, which means that a lot of agricultural land capacity can no longer be used (Environmental Service, 2020). Based on Pratiwi (2022), to create a maintained environmental condition, semi-organic farming integrated with a hydroponic system is a good way to overcome the condition of lack of soil fertility and organic

materials that are utilized as a source of vegetable growth to produce healthy semi-organic vegetables. So cultivation with a semi-organic method integrated with hydroponics in the Eco-Hydro business has become a solution to overcome the problem of infertile agricultural land due to the impact of chemical agriculture. In addition, it can increase the production of healthy semi-organic vegetables that are safe for consumption (Umikalsum, 2020).

Eco-Hydro produces semi-organic vegetables produced in 400 planting holes in a hydroponic installation. The vegetables produced are priority hydroponic vegetables in Limapuluh Kota Regency: lettuce, pakcoy, and kale. These four vegetable commodities are widely sought after and in demand because their content and benefits are very good for health, primarily if cultivated hydroponically. In addition, the addition of organic materials that can be a source of nutrition through a combination of the use of AB- Mix nutrients with Biosaka as an elicitor in hydroponic vegetables, is an added value of the products produced in this business (Azalia et al., 2023).

Integrating Biosaka into hydroponic systems is a promising innovation that supports production cost efficiency and increases agricultural productivity. Biosaka, made from natural ingredients such as leaves and grass, has been shown to reduce dependence on chemical fertilizers by 50-90%, as stated by Reflis et al. (2023) and Abror et al. (2023). In addition, research shows that Biosaka functions as a natural elicitor that can increase plant resistance to pests and diseases (Ramli et al., 2023). Biosaka is also known to provide more environmentally friendly protection than synthetic pesticides, making it an innovative solution for the sustainable agricultural sector. Efficient nutrient management requires the integration of Biosaka, which offers the potential to replace or complement conventional nutrient solutions. Research by Setiawan et al. (2023) shows that hydroponic systems are often associated with efficient and healthy modern agriculture, so Biosaka has the potential to provide additional benefits in the form of improving the quality of harvest results, such as texture, taste, and nutritional value of products. On the other hand, Andayani et al. (2023) emphasized that using Biosaka can reduce input costs, helping increase farmers' profit margins in efficiency-oriented business schemes.

Based on the findings of two previous studies, the economic feasibility of hydroponic systems on a small and medium scale shows that this technology can be successfully implemented despite the challenges associated with high initial costs. According to Zaenuddin et al. (2023), this factor is due to a lack of understanding of the essential cost and revenue analysis, not projected in depth, making it difficult to know whether the business being run has generated profits with optimal capital expenditure. Research by Souza et al. (2023) shows that applying a hydroponic system with a sand substrate technique can remain economical despite market uncertainty and risk, providing opportunities for small farmers to adopt the technology. Meanwhile, Folorunso et al. (2023) found that hydroponics on a small and medium scale in Nigeria can generate significant long-term profits, even with high initial capital, achieved through analyses such as NPV, IRR, and sensitivity analysis of costs and revenues. These two studies highlight the importance of a deeper understanding of the economic feasibility and resilience to market uncertainty aspects of hydroponic applications, which are increasingly relevant in addressing the challenges of hydroponic businesses in rural areas, as found in the study conducted by Danis et al. (2023). However, previous studies have not discussed how Biosaka can be integrated into hydroponic systems to increase income efficiency significantly. Therefore, digging deeper into how using Biosaka to complement hydroponic systems can potentially increase profits and reduce dependence on conventional technologies such as Ab-mix, which currently do not show apparent differences in profits.

Research gaps in the Eco-Hydro hydroponic business, it is necessary to conduct an analysis related to the adoption of the use of biosaka as a complement to AB-Mix nutrients to determine the amount of additional costs incurred and its impact on the efficiency and effectiveness of agricultural businesses in assessing in detail the costs of production, Income, and profits obtained. This study provides innovation in evaluating Income from using complementary nutrients AB-Mix and Biosaka in hydroponic cultivation and whether it is efficient in generating maximum Income compared to hydroponic cultivation using 100% AB-Mix. This study aims to analyze the economic efficiency of previous usage recommendations related to using 37.5% AB-Mix and 62.5% Biosaka in hydroponic vegetable farming using 100% conventional AB-Mix. Thus, this study can recommend continuing the business with more effective and efficient income-generating treatments. In addition, this study will also formulate income projections through cash flow from recommendations for maximum cultivation treatment in generating profits as input for business decision-making to ensure business continuity.

MATERIALS AND METHODS

This research was conducted from February to June 2024, starting from the preparation stage and ending with the preparation of research results. This research was conducted at the Eco-Hydro Hydroponic Tanjung Pati business, Limapuluh Kota Regency, West Sumatra.

Figure 1. Eco-Hydro hydroponic vegetable business location

This study uses a purposive sampling approach to ensure the data obtained is relevant and supports the research objectives. The selection of this method is based on the need to obtain in-depth information from business actors who have used the hydroponic system with a combination of AB-Mix and Biosaka. This approach allows research to focus on groups or individuals with direct experience so that the results are more accurate and relevant in measuring cost and income effectiveness. Primary data was obtained by identifying components of production costs and sales results for two consecutive months of production. In the first month, cultivation focused on a combination of 37.5% AB-Mix and 37.5% Biosaka, as recommended by Ibnusina (2023), which states that the combination of organic materials and AB-Mix can optimize the efficiency of dissolved nutrients in hydroponic cultivation. In the second month, the cultivation system used 100% AB-Mix to compare the effectiveness of the methods. Data was collected in stages due to the limited number of planting holes in the available hydroponic installations. In addition, field observations of consumers were carried out to describe the level of demand and Income that the Eco-Hydro hydroponic business could achieve. Secondary data was obtained from various reliable sources, including statistical data from BPS, scientific research articles, proceedings, and literature reviews.

The variables in this study are categorized as follows: Independent variables are the percentage of nutrient usage, precisely the combination of 37.5% AB-Mix and 62.5% Biosaka, compared to 100% AB-Mix. The rationale for selecting these combinations is based on findings by recent studies (Danis et al., 2023; Souza et al., 2023; Folorunso et al., 2023), which emphasize the role of optimized nutrient mixes in improving hydroponic efficiency and reducing costs. Biosaka, as an organic elicitor, has been shown to complement synthetic nutrients effectively, enhancing plant growth and profitability (Nduru et al., 2024). The dependent variable is Income, which is the difference between total revenue and production costs. Income is a direct indicator of profitability and is critical for assessing economic feasibility (Souza et al., 2023). Measured using the R/C Ratio, which quantifies the economic feasibility and profitability of the farming system. This metric is validated by its application in similar agribusiness contexts (Pratama et al., 2024)

The data analysis employed a structured approach combining quantitative and qualitative methods. Quantitative analysis included calculating costs and revenues, R/C ratio evaluation, and cash flow projections for three years to determine long-term business sustainability. Specifically, the R/C ratio, defined as the ratio between total revenue and total costs, was employed to evaluate the profitability of each treatment method, where values above 1 indicate economic feasibility. The Income and feasibility of hydroponic vegetable farming are calculated based on one planting season during the study (Zaenuddin et al., 2023). The calculated value of the R/C ratio will later be used to determine whether the Income generated is feasible or not to run (Romadhona, 2024). Reason for selection: the R/C Ratio is a standard tool in agricultural economics for assessing profitability and feasibility. It based Mauki et al. (2023) demonstrate its reliability in evaluating the financial viability of innovative farming systems like hydroponics. An R/C ratio is more significant than one and indicates a profitable enterprise essential for sustainable agribusiness decision-making.

Qualitative analysis involved field observations to gather data on consumer preferences and market demand trends. Structured interviews with hydroponic business actors provided additional insights into operational challenges and perceptions of Biosaka adoption. This combination of quantitative and qualitative methods ensures a robust evaluation of Biosaka's contribution to

economic efficiency. According to Rosyandi et al. (2019), farm income is obtained from the difference between total revenue and total production costs incurred during the production process, the calculation of which includes the following:

1. Total cost

Add up all costs incurred during the research activity. Total costs can be calculated using the formula as follows:

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

Information : TC = Total cost, FC = Fixed cost, VC = Variable cost

2. Revenue

Revenue analysis is done by projecting the revenue received for a period. Revenue can be calculated using the formula:

$$TR = P \times Q \quad (2)$$

Information : TR = Total revenue, P = Price, Q = Production quantity

3. Income

Income analysis is done by making calculations using the following formula equation:

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

Information: π = Income from hydroponic vegetable farming, TR = Income from hydroponic vegetable farming, TC = Total costs incurred by the hydroponic vegetable business

4. R/C Ratio

The R/C ratio is used for analysis of a business that is being run, whether it can be said to be feasible or not to be run. According to Nugroho (2021), feasibility can be measured using the R/C ratio formula as follows:

$$R/C = (Pq \ .Q)/((TFC+TVC)) \quad (4)$$

Information: R = Revenue, C = Cost, Pq = Price of quantities (Product Price), TVC = Total variable cost (Variable cost), TFC = Total fixed cost, Criteria on the R/C ratio, among others: R/C ratio > 1 then farming is said to be profitable, R/C ratio = 1 then the farming business is said to be BEP, R/C ratio < 1 then the farming business is said to be at a loss.

5. Cashflow Calculating

The calculation results are then used to formulate a cash flow projection to estimate cash inflow and outflow, which helps see how much Income will be obtained. The cash flow projection is made in the next three years, and the results of this projection will later be used as recommendations in the decision-making process of the Eco-Hydro hydroponic vegetable business. In addition, cash flow projections provide insight into long-term financial trends and support strategic planning and decision-making. Recent studies have shown that cash flow analysis helps businesses anticipate risks and identify growth opportunities (Partomo, 2024). According to Pereira et al. (2024), the cash flow has steps: first, calculate the difference between the receipts and expenses for each category, and last, calculate all cash flows to determine net cash flow. In terms of calculations, cash flow has the following formula (Laghari et al., 2023):

$$\text{Net Cash Flow} = \text{Operating CF} + \text{Investing CF} + \text{Financing CF} \quad (5)$$

RESULTS AND DISCUSSION

Eco-Hydro Business Overview

Eco-Hydro is a startup business engaged in vegetable cultivation using the hydroponic method that produces vegetables such as lettuce, kale, and pakcoy—*Eco-Hydro,* which stands for *Ecosystem Organic Hydrofarm*. Eco-Hydro was established in 2023 in Tanjung Pati, Harau District,

Limapuluh Kota Regency, West Sumatra. Initially, Eco-Hydro focused on hydroponic melon production, but because it saw an excellent opportunity for hydroponic vegetables due to high demand, it switched to hydroponic vegetable production. Eco-Hydro's consumers are primarily from the lower to upper-middle-class segments. The targeted segments include students, agency employees, Geprek chicken restaurants, kebab traders, supermarkets, hotels, and cafes. The results of Eco-Hydro hydroponic vegetable production have been distributed to various regions of West Sumatra (Payakumbuh City, Bukittinggi, Pariaman, West Pasaman, East Pasaman, Batusangkar, Padang), and some have even reached outside the West Sumatra region, namely Riau and North Sumatra.

The distribution of consumer areas can be widely reached because Eco-Hydro has adopted online promotions through Instagram and WhatsApp media.

Figure 1. Social media branding on Instagram Eco-Hydro: instagram.com/eco.hydro_/

The product is sold cheaper than other conventional products, and the Price of hydroponic vegetable products is made relatively affordable starting from IDR5,000 / *pack* with a product weight of 200gr. The weight of 500gr is given a price of IDR. 12,000 / *pack* and the weight of 1000gr is given IDR. 25,000 / *pack*. With this Price, it can still reach almost all consumer groups.

Figure 2. Packaging form for eco-hydro vegetable products.

Figure 3. Eco-Hydro vegetable product promotion catalog online.

Based on the survey, Eco-Hydro produces hydroponic vegetables in one harvest period for almost one month (27 days), starting from planting preparation to harvesting. In one period, it can

produce 20kg-50kg of vegetable products ready to be sold in 400 planting holes based on market demand.

Eco-Hydro utilizes environmental resources that have the potential to support existing production. The availability of basic materials for making Biosaka solutions, namely clean leaves, is effortless to obtain in the surrounding environment. As for the use of pesticides, it uses plant pesticides from Kipahit leaves, which are widely available and grow wild, especially in the Limapuluh Kota Regency area (Tasnia et al., 2022). Wild Kipahit leaves reduce dependence on chemical pesticides and support more environmentally friendly farming practices for Eco-Hydro businesses. Kipahit leaves have the potential to be applied in the field as an organic pesticide to help control pests without damaging the local ecosystem (Andini & Kuswandi, 2022).

Hydroponic Vegetable Financing

According to Zaenuddin et al. (2023), financing for hydroponic vegetable businesses is calculated by differentiating various cost components, including fixed costs and variable costs. According to Apriani (2017), fixed costs *are* financing whose size does not depend directly on the production size produced and is not used up in one production process in one planting period. Furthermore, variable costs are greatly influenced by the production size and are used up in one planting period. In detail, the following are the components of the fixed costs of the Eco-Hydro hydroponic vegetable business per month.

1. Fixed Costs

a) Investment Tools

Table 1. Details of investment costs for equipment

Tool Name	Amount	Unit Price	Cost (IDR)	Depreciation (IDR)/Month
Net Pot	400 Pieces	50,000/one pack (100 pieces)	200,000	11.111
TDS meter	1 piece	80,000	80,000	3.333
Tank	2 pieces	90,000	180,000	5,000
Liters	2 pieces	32,000	64,000	1,778
Water pump	2 pieces	85,000	170,000	4.722
Tray	2 pieces	15,000	30,000	1,250
Scales	1 piece	195,000	195,000	4,062
Basket	2 pieces	105,000	210,000	3,500
Hand sprayer	2 pieces	70,000	140,000	11,667
Jar	2 pieces	25,000	50,000	2,083
Total			1,319,000	48,506

Source: Data processed by the author, 2024

Based on the analysis in Table 1, the details of the investment costs of the equipment issued when starting a business plan are described. The details of the equipment investment are very diverse, covering 10 required components. The total investment reaches IDR 1,319,000 with a monthly depreciation cost calculation of IDR 48,506. There is depreciation because the equipment used will have an economic life. In line with Pontoh's statement (2013), along with the tool use time, it will have a functional economic life that can decrease or begin to depreciate its usefulness in producing goods or services every month.

b) Rent and Labor Costs

Table 2. Details of rental and labor costs

Components	Cost
Land Rental	140.00
Daily Labor (4 times a month)	400,000
Marketing Costs	200,000
Electricity and Water Costs	50,000
Total	650,000

Source: Data processed by the author, 2024

Table 2 shows the use of costs for rent and labor, which includes four financing components, namely land rent daily labor for 4 times (while labor is used 4 times in one month because business actors still can manage their businesses, so they only need labor). Work for one week is only one day

during plant care, harvest, and marketing), then the next component is marketing and electricity costs. So, based on the calculation of the total cost of IDR. 650,000.

c) Recapitulation of Fixed Costs

Table 3. Total cost of investment and labor rental

Components	Cost
Depreciation of equipment investment per month	48,506
Total cost of rent and labor	620,000
Total	967,583

Source: Data processed by the author, 2024

The total investment and labor rental costs in Table 3 show the total fixed costs. The total of these costs reaches up to IDR 967,583. The costs incurred in this fixed cost classification significantly influence operational costs. According to Nursida et al. (2022), fixed-cost financing must be considered because each investment component significantly affects the output of production income. According to Odusanya et al. (2024), fixed costs, including rent and labor, affect agricultural production's output and Income, so fixed cost management is essential to increase profitability. So, this understanding is important to calculate the total fixed costs, including labor rental.

2. Variable Costs

Table 4. Details of variable cost expenditure in one planting period

Material Name	Unit	Details		
		Need	Price (IDR)	Amount (IDR)
AB Mix	Liter	8	50,000	100,000
Pakcoy seeds	Pack	3	15,000	45,000
Water spinach seeds	Pack	3	3,000	9,000
Lettuce seeds	Pack	1	25,000	25,000
Rockwool	Slab	8	2	16
Plastic packaging	Kg	2.5	2.5	5
Sticker paper	Sheet	4	8	8
Plastic bags	Pack	2	9,000	18,000
Kipahit leaves	Kg	0.25	22	11
Egg white	Item	1	2,000	318
Grass	Gram	1,000	0	0
Total				197,358

Source: Data processed by the author, 2024

Table 4 shows raw materials' total variable or operational costs that must be incurred in one planting period. Eleven components must be met in variable costs to reach up to IDR 197,358 per month (one planting period). Using these raw materials shows efficiency in business management and must be optimized as much as possible to obtain maximum results (Rahun, 2018). Regarding the distinction between production using 37.5% AB-Mix and 37.5% Biosaka, with the use of 100% AB-Mix, there is no difference in the cost of expenditure because, in terms of field conditions, biosaka only utilizes fresh grass that can be obtained without spending money on purchasing the ingredients. The manufacture is also straightforward: mix 5 liters of biosaka solution and 250 grams of fresh leaves with an additional 5 liters of water (Danis et al., 2023). So, there is no difference in expenditure in financing for production using 100% AB-Mix.

3. Financing Recapitulation

Table 5. Total of all financing

Components	Cost
Fixed Costs	668,506
Variable costs	197,358
Total	865,864

Source: Data processed by the author, 2024

The total financing between fixed and variable costs in Table 5 shows that the total overall production operational costs in one planting period reached IDR 865,864.

Hydroponic Vegetable Revenue Analysis

Hydroponic vegetables can be harvested when they are 3 weeks old after planting. Vegetables sold must have good growing conditions and be physically fresh. According to Jubandi Dianto (2022), the Income obtained from a business depends on the commodity's selling price and the sales volume or total value generated. The following is a table of receipts for Eco-Hydro hydroponic vegetables. The following is a detailed description of the production and receipts of hydroponic vegetables.

Table 6. Comparison of total production and revenue during one period.

Vegetables	AB-Mix Complementary Biosaka (Month 1)		AB-Mix (Month 2)	
	Weight (Kg)	Reception	Weight (Kg)	Reception
Pak Choy	25.6	768,000	16.4	410,000
Water spinach	10	50,000	7.8	195,000
Lettuce	15.2	76,000	11.4	285,000
Total	50.8	1,270,000	35.6	890,000

Source: Data processed by the author, 2024

Table 6 compares Income between vegetable production using AB-Mix Complementary Biosaka and AB-Mix in two periods but with different treatments. Production is not carried out simultaneously due to limited hydroponic installation land, so it requires two different planting periods for hydroponic nutrient treatment, but still in the same procedure starting from the same installation with the same planting holes, namely 400 planting holes, seeding, sowing, nutrient application, maintenance, to harvesting which is the same sale price of IDR 5,000 / pack weighing 200 grams. This means that per kilogram, the selling price is IDR 25,000 / kg.

The Income obtained for the 37.5% AB-Mix Complementary 62.5% Biosaka treatment reached 50.8 kg with a total income of IDR 1,270,000. The 100% AB-Mix treatment produced 35.6 kg with a total income of IDR 890,000. The difference in production results is due to the adoption of biosaka technology, which is more effective in increasing the weight of hydroponic vegetable production results than using 100% full Ab-Mix. This is based on the research results by Danis et al. (2023). Using AB Mix 3 ml (37.5%) combined with Biosaka 5 ml (62.5%) is the best treatment and can reduce dependence on AB Mix nutrients. The results are proven by the average fresh weight production of vegetables obtained being heavier than vegetables produced using 100% Ab-Mix.

Hydroponic Vegetable Income Analysis

Income is a profit, which describes the difference obtained from the receipt and all total costs incurred. According to Kilmanun & Ndaru (2020), a farming business analysis is used to assess the level of success of farming activities as a benchmark for designing future conditions. Two data types are needed to calculate Income: the total costs incurred during the specified farming period and the total Income. Because the existence of a specific period becomes a factor that influences farmer income, it emphasizes the importance of costs and Income in determining the feasibility of investment in agriculture (Polar et al., 2021). The following are the results of the income analysis of the Eco-Hydro hydroponic vegetable business that have been calculated.

Table 7. Comparison of revenue acquisition in one period

Components	Cost	
	AB-Mix Complementary Biosaka (Month 1)	Ab-Mix (Month 2)
Total Revenue	1,232,083	890,000
Total cost	865,864	865,864
Total	366,219	24.136

Source: Data processed by the author, 2024.

Table 7 compares the benefits of hydroponic vegetable cultivation with 37.5% AB-Mix Complementary 62.5% Biosaka treatment, and 100% AB-Mix treatment, showing a significant difference in benefits. AB-Mix Complementary Biosaka provides a total profit of IDR 366,219, and AB-Mix provides a total profit of IDR 24,136. Table 8 shows the feasibility of the business process for Eco-hydro hydroponic vegetables using the adoption of two treatments that are used as recommendations for business sustainability.

Table 8. Comparison of R/C ratio analysis of business

Components	R/C Ratio
AB-Mix complementary biosaka (month 1)	1.40
Ab-Mix (Month 2)	1.02
Conclusion	Both Are Worthy

Source: Data processed by the author, 2024.

The feasibility analysis in Table 8 compares the feasibility of hydroponic vegetable cultivation with 37.5% AB-Mix Complementary 62.5% Biosaka treatment and 100% AB-Mix treatment, which has a very significant difference in ratio. Hydroponic vegetable cultivation with 37.5% AB-Mix Complementary 62.5% treatment produces an R/C ratio of 1.4. Meanwhile, the 100% AB-Mix treatment produces an R/C ratio of 1.02. The R/C ratio of 1.4 shows that for every IDR1.00 invested in this cultivation, there is a return of IDR1.40. Hydroponic cultivation with a combination of AB Mix and Biosaka produces more significant profits than the costs incurred. An R/C ratio of 1.02 means that for every IDR1.00 spent, the return obtained is only IDR1.02, slightly higher than the production costs. This shows that using 100% AB Mix still provides benefits but with a tiny margin.

The description is given in the comparison of the R/C ratio, although both have the same feasibility, namely the R/C ratio, which is more than or equal to 1, as a recommendation, it is seen in terms of efficiency in generating more significant Income. The RC Ratio used shows the efficiency of capital use and how this ratio reflects the rate of return on capital investment, so it can be said that a high RC Ratio shows efficiency in generating Income (Mako & Kumalasari, 2024). Therefore, it is clear that using a mixture of 37.5% AB Mix and 62.5% Biosaka is more efficient and profitable than using 100% AB Mix and can reduce dependence on AB Mix nutrients without sacrificing economic feasibility. So, the recommendation is that hydroponic vegetable cultivation with 37.5% AB-Mix Complementary 62.5% Biosaka treatment in the Eco-Hydro business is appropriate and can still be used for business sustainability.

Production costs harm the Income of female farmers in Samudera District. The combination of AB-Mix and Biosaka increases profits by up to 140% from a heavier production weight than AB-Mix 100%. This result is in line with the findings of Danis et al. (2023), which showed that Biosaka can increase the weight of hydroponic harvests by up to 30% to increase Income significantly. In line with Usman Yanti (2020), the amount of vegetable production influences agricultural Income.

Although this study shows that the mixture of AB-Mix 37.5% and Biosaka 62.5% is more efficient and profitable than AB-Mix 100%, there are several limitations. Some of the main limitations are the limited hydroponic installations to produce hydroponic vegetables with a larger capacity, the short duration of the study, and the lack of similar studies that can be used as a comparison. Until now, only one relevant study has been found, namely by Danis et al. (2023), which also discusses integrating organic materials, especially biosaka, in hydroponically cultivated vegetables. This shows that research related to integrating Biosaka in hydroponic systems is still minimal regarding the number of studies and the scope of analysis.

Cash Flow in Future Income Projections

The recommendations given to the Eco-Hydro hydroponic vegetable business, the AB-Mix 37.5% Biosaka 62.5% Complementary production process, have provided income projections for cash flow in the next three years. According to Partomo (2024), with a 3-5-year overview, businesses can plan a more accurate budget, identify potential financial risks earlier, and create mitigation strategies for possible challenges. In addition, the Eco-Hydro business needs to expand its capacity in the future. Therefore, funding from third parties is also very much needed. Realistic income projections from more efficient managerial practices can help attract investor interest in generating investor interest by showing the potential for growth and profitability of a business being run (Saputra et al., 2024) because they tend to be more interested in businesses that have precise financial projections, especially in the next 3 years (Lighter Capital, 2024). The following are the results of the Eco-Hydro business cash flow proxy for the next three years.

Cash flow in Table 9 shows that the Eco-Hydro hydroponic vegetable cultivation business for 1 year has a potential yield of IDR8,428,896 with a business scale capacity of 400 planting holes. The cash flow shows that the business can generate positive cash flow and increase the cash balance. Based on this cash flow projection, recommendations for the Eco-Hydro business can be formulated to maximize profits by adopting appropriate technology through vegetable production with AB-Mix Complementary Biosaka in order to survive, namely as follows, optimizing the use of nutrition and technology, Expand production capacity and Marketing and sales strategies.

Table 9. *Cash flow* revenue projections for the next three years.

Information	Year 1 (IDR)	Year 2 (IDR)	Year 3 (IDR)
Beginning Cash Balance	0	2,809,632	5,619,264
Cash Receipts			
Sale	15,240,000	15,240,000	15,240,000
Total Cash In	15,240,000	15,240,000	15,240,000
Cash Disbursement			
Raw Material Cost	2,368,296	2,368,296	2,368,296
Equipment Depreciation Cost	582,072	582,072	582,072
Overhead Costs	4,680,000	4,680,000	4,680,000
Labor costs	4,800,000	4,800,000	4,800,000
Total Cash Out	12,430,368	12,430,368	12,430,368
Ending Cash Balance	2,809,632	5,619,264	8,428,896

Source: Data processed by the author, 2024.

CONCLUSIONS AND SUGGESTION

This study demonstrates that the hydroponic cultivation method using a combination of 37.5% AB-Mix and 62.5% Biosaka is more profitable than the complete 100% AB-Mix method for the Eco-Hydro business. The combination method achieves an R/C ratio of 1.4, indicating that every IDR1 invested yields IDR1.4, compared to an R/C ratio of 1.02 for the 100% AB-Mix method. Cash flow projections over three years reveal a positive trend, with increasing end-of-year balances, highlighting strong financial sustainability for this approach. However, limitations of this study include a relatively small sample size, short study duration, and a lack of comparable research. To improve the adoption and scalability of these findings, future research should consider expanding the sample size and extending the study duration to understand better the long-term impacts of Biosaka on crop yields and economic viability. Practical recommendations for hydroponic businesses include Adopting the Combination Method: Hydroponic businesses should integrate the 37.5% AB-Mix and 62.5% Biosaka formula to enhance efficiency and profitability while reducing reliance on synthetic nutrients. Policy Support for Sustainable Practices: Governments and agricultural organizations should provide incentives for adopting environmentally friendly practices, such as subsidies for Biosaka production and training programs. Expansion into Diverse Markets: Businesses should leverage the cost-efficiency of this combination method to target diverse consumer markets, emphasizing the health benefits and sustainability aspects of their products.

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REFERENCES

Apriani, A.E, Soetoro, S., & Yusuf, M.N (2017). Analysis of corn farming (Zea mays L). *Agroinfo Galuh Student Scientific Journal*. 2(3), 145-150. Doi: http://dx.doi.org/10.25157/jimag.v2i3.277.

Agustian, I., Prayoga, B.I., Santosa, H., Daratha, N., & Faurina, R. (2022). NFT Hydroponic Control Using Mamdani Fuzzy Inference System. *Journal of Robotics and Control (JRC),* 3(3), 374-383. Doi: https://doi.org/10.48550/arXiv.2208.00364.

Andini, M., & Kuswandi. (2022). Potensi Pemanfaatan Daun Suren dan Kipahit dalam Mengendalikan Hama Kutu Putih pada Pepaya Secara In Vitro. *Jurnal Pembangunan Nagari*, 7 (1), 41-52. Doi: https://doi.org/10.30559/jpn.v7i1.300.

Azalia, A., Putrantri, D., & Zulfahmi, R. (2023). Analisis Usaha Tani Tanaman Jagung Manis Berbasis

Biosaka. *JTPG (Jurnal Teknologi Pertanian Gorontalo),* 8(2), 39-47. Doi: https://doi.org/10.30869/jtpg.v8i2.1255.

Abror, L.A.A., & Azmi, I. (2023). Sosialisasi dan pembuatan biosaka sebagai solusi dalam mengurangi penggunaan pupuk kimia di Desa Selaparang. *Jurnal Pengabdian Magister Pendidikan IPA*, 6(2), 390-393. Doi: https://doi.org/10.29303/jpmpi.v6i2.3194.

Dinas Tanaman Pangan, Hortikultura, dan Perkebunan Provinsi Sumatera Barat. (2023, Desember 29). Produksi Tanaman Buah dan Sayur Tahunan di Sumatera Barat. Badan Pusat Statistik. https://sumbar.bps.go.id/id/statistics-table/3/WXpSVU5uUTBOSEl5WVhGQmVESTVSVnBSVlhWeVVUMDkjMw==/produksi-buah-buahan-dan-sayuran-tahunan-menurut-jenis-tanaman-di-provinsi-sumatera-barat--2023.html .

Dinas Lingkungan Hidup. (2020, November 13). This is the Cause of Soil Pollution. Dinas Lingkungan Hidup Kota Semarang. https://dlh.semarangkota.go.id/ini-dia-penyebab-terjadinya-pencemaran-tanah/.

Danis, R., Ibunisa, F., Darnetti. (2023). The complementary role of ab mix and biosaka nutrients on the growth and production of hydroponic lettuce. *Journal Ummat*. 1(1), 1-13. https://journal.ummat.ac.id/journals/17/articles/15381/supp/15381-50385-1-SP.docx .

Folorunso, E. A., Schmautz, Z., Gebauer, R., & Mraz, J. (2023). The economic viability of commercial-scale hydroponics: Nigeria as a case study. *Heliyo*, 9 (8), 1-10. Doi: https://doi.org/10.1016/j.heliyon.2023.e18979.

Ibnusina, F. (2023). Hydroponic Plant Cultivation. Plant Cultivation Competency Laboratory. Payakumbuh State Agricultural Polytechnic. https://ppnp.ac.id/budidaya-tanaman-Agronomi/

Jubandi, H., Susanto, H., & Dianto, A.K. (2022). Analysis of Hydroponic Vegetable Business in Sonokwijenan Sukomanungga Sub-District Surabaya. *AGRIWITAS (Agribisnis Wijaya Putra Surabaya)*, 1(2):49-64. Doi: https://doi.org/10.38156/agriwitas.v1i02.14.

Kilmanun, J.C., & Ndaru, R.K. (2020). Anika. A, & Putra. EPD 2020 hydroponic vegetable farming income analysis with the deep flow technique (DFT) system. *Lampung Agricultural Engineering Journal*, 9(4), 367-373. Doi: http://dx.doi.org/10.23960/jtep-l.v9i4.367-373 .

Laghari, F., Ahmed, F., & López García, M. D. L. N. (2023). Cash flow management and its effect on firm performance: Empirical evidence on non-financial firms of China. *Plos one*, 18(6), 1-29. Doi: https://doi.org/10.1371/journal.pone.0287135.

Lighter Capital. (2024). Creating Realistic Financial Projections for Your Startup. Accessed on December 2024. Available online at: https://www.lightercapital.com/blog/financial-projections-for-startups?utm_source=chatgpt.com.

Mauki, C., Jeckoniah, J., & Massawe, G.D. (2023). Smallholder rice farmers profitability in Agricultural Marketing Co-operative Societies in Tanzania: A case of Mvomero and Mbarali districts. *Heliyon*, 9(6), 1-9. Doi: https://doi.org/10.1016/j.heliyon.2023.e17039.

Mako, M., & Kumalasari, D. A. (2024). Analisis Kelayakan Usaha Produk Minuman Herbal Jahe Merah Blk Maneresanus Di Kabupaten Kediri. *Jurnal Pemasaran Bisnis*, 6(4), 19-34. https://journalpedia.com/1/index.php/jpb/index.

Nugroho, Arif.Y, & Anudiyan, A.M. (2021). Projection of BEP, RC Ratio, and R/L Ratio on Business Feasibility (Case Study on Bean Sprouts Business in Wonoagung Village, Tirtoyudo, Malang Regency). 2(1), 27-37. https://www.neliti.com/publications/344676/proyeksi-bep-rc-ratio-dan-rl-ratio-terhadap-kelayakan-usaha-studi-kasus-pada-usa .

Nursida, N., Rusmiyati, R., & Istikomah, I. (2022) Analysis of Income and Profit Level of Hydroponic Vegetable Farming Business in Sangatta Utara District, East Kutai, 1(1), 1-9. https://repositori.stiperkutim.ac.id/id/eprint/133/1/Repository_Hidroponik%20%20%28edit%29.pdf.

Ndruru, H.S., Telambanua, P.H., Nazara, R.V., & Gulo, S.D. (2024). Pemanfaatan Elicitor Pada Tanaman. *Jurnal Sapta Agrica* , 3 (1), 39-51. Doi: https://doi.org/10.57094/jsa.v3i1.1857.

Odusanya, I.A., Toriola, A.K., Adeniwura, O.O., Sokundi, G.M., & Lawal, O.A. (2024). Agricultural Financing And Agricultural Output In Nigeria. *International Journal of Food and Agricultural Economics,* 12(4), 333-353. Doi: https://www.doi.org/10.52589/AJAFR-PMRPG9BL.

Pratiwi. Y.I. (2022). Development of organic farming: inventory, constraints, prospects, and socialization strategies. Learning Module of the Merdeka University of Surabaya.

Pratama, I.A., Suryantini, A., Perwitasari, H., Susanti, W., & Yunanto, Y. (2024). Profitability analysis and rice check measurement of rice cultivation in Daerah Istimewa Yogyakarta. *EDP Sciences*, 595(16), 1-16. Doi: https://doi.org/10.1051/e3sconf/202459504011.

Partomo, S. (2024, November 13). The Importance of Determining Financial Projections in a Business Plan. PT Ukirama Solusi Indonesia. https://ukirama.com/blogs/pentingnya-menentukan-proyeksi-keuangan-dalam-business-plan/ .

Pontoh, W. (2013). Accounting Concepts and Applications. Moeka Publisher. West Jakarta. https://repo.unsrat.ac.id/845/

Pereira, A. V., Dias, R., Galvão, R., & Varela, M. (2024). Cash Flow and Its Components in Investment Valuation. *Revista de Gestão Social e Ambiental*, 18(5), 1-20. Doi: https://doi.org/10.24857/rgsa.v18n5-118.

Polar, V., Ashby, J., Thiele, G., & Tufan, H. (2021). When is choice empowering? Examining gender differences in varietal adoption through case studies from Sub-Saharan Africa. *Sustainability* 13 (7): 1-19. Doi: https://doi.org/10.3390/su13073678.

Rahun, A. (2018). Raw Material Cost Management in Modern Agricultural Industry. Jakarta: Agribisnis Publisher.

Rosyandi, A. N., Supadi, S., & Windhani, K. (2019). Rice Selling Vs. Grain Selling Farms: Which One is More Profitable? *Eko-Regional*, 14(1), 57-56. Doi:10.20884/1.erjpe.2019.14.1.1272

Romadhona, S. (2024). Economic Potential For Development Of Organic Agriculture In Food Crops And Horticulture In Supporting Sustainable Agriculture. *AGRIBUSINESS JOURNAL*, 18(1), 290-302. Doi: https://10.15408/aj.v18i1.38771.

Ramli, A., Adirianto, B., & Rachmat, R. (2024). Aplikasi Pupuk Organik Biosaka dan NPK Terhadap Peningkatan Pertumbuhan Tanaman Padi (Oryza sativa L.): Application of Biosaka and NPK Organic Fertilizer to Increase the Growth of Rice Plants (Oryza sativa L.). *Jurnal Agrisistem*, 20(1), 24-30. Doi: https://doi.org/10.52625/j-agr.v20i1.318.

Resdiana, F.R, Wagiono, W., & Suhaeni, S. (2022). Analysis of Business Feasibility and Added Value of Pakcoy Vegetables (Brassica rapa L.) Hydroponically Packaged (Case Study of CV Spirit Wira Utama, South Tangerang). *Wahana Pendidikan Scientific Journal*, 8(15):243-254. Doi: https://doi.org/10.5281/zenodo.7049136.

Reflis, R., Sumartono, E., Arianti, N.N., & Sukiyono, K. (2023). Biosaka Pengembangan Pertanian Organik. *Community Development Journal : Jurnal Pengabdian Masyarakat*, 4(2), 2939–2945. Doi: https://doi.org/10.31004/cdj.v4i2.14691.

Soleh, M.I. (2022, November 13). Dangers of Physical, Biological, and Chemical Contamination in Agricultural Products. Kementerian Pertanian, Direktorat Jenderal Tanaman Pangan. https://tanamanpangan.pertanian.go.id /detil-konten/iptek/116.

Setiawan, S., Tutik, P.I., Rahayu, A.S., Yuliana, A., Suyanto, R., Astar., A.I & Selmitri, S. (2023). Pelatihan Pembuatan Biosaka Sebagai Alternatif Kebutuhan Pupuk Pada Kelompok Tani Pontianak Barat. *Jurnal Bhakti Masyarakat FPST*, 1(1), 28–33. https://jurnal.upb.ac.id/index.php/bhaktimasfpst/article/view/409.

Souza, V., Gimenes, R.M.T., de Almeida, M.G., Farinha, M.U.S., Bernardo, L.V.M., & Ruviaro, C.F. (2023). Economic feasibility of adopting a hydroponics system on substrate in small rural properties. *Clean Technologies and Environmental Policy*, 25(8), 2761-2775. Doi: 10.1007/s10098-023-02529-9.

Saputra, E. T. A., Indradewa, R., Negoro, D. A., & Hamdi, E. (2024). Due Diligence in Financial Aspects for Mobile Fuel Station Business Development. *Dynamic Management Journal*, 8(3), 827-844. Doi: http://dx.doi.org/10.31000/dmj.v8i3.11289.

Tasnia, FH Ibnusina, F., & Alfikri. (2022). Analysis of the Use of Botanical Pesticides in Hydroponic Pakcoy (Brassica Rapa L.) Cultivation Efforts. *Fruitset Science: Journal of Agriculture Agrotechnology*, *10* (3), 138-145. https://www.ejournal.iocscience.org/index.php/Fruitset/article/view/2849 .

Umikalsum, R.A. (2020). Analysis of hydroponic lettuce farming in Eve's Veggies Hydroponics garden, Palembang City. *Societa: Journal of Agribusiness Sciences*. 8(1), 52–57. Doi: https://doi.org/10.32502/jsct.v8i1.2034.

Usman, U., & Yanti, M. (2020). Analisis faktor-faktor yang mempengaruhi pendapatan petani padi wanita di Kecamatan Samudera Kabupaten Aceh Utara. *Jurnal Ekonomi Pertanian Unimal*, 3(1), 19-32. Doi: https://doi.org/10.29103/jepu.v3i1.3175.

Zaenuddin, RA, Potabuga, F., & Pakanyamong, A.A.K. (2023). Income of Andri Farm Hydroponic Vegetable Business in Hanga-Hanga Village, Banggai Regency. Scientific Journal of Students of the Faculty of Agriculture, 3(1), 284-291. doi: https://10.0.203.77/jimfp.v3i1.455