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Analysis of Tilapia (Oreochromis Niloticus) Hatchery Business at PT. STP, Karawang, West Java

Catur Pramono Adi[1*], Pola Sabar Tumohom Panjaitan[1], Budi Sulistiyo[1], Muhammad Yusuf[1], Aripudin[1], Mohammad Ismail[1], Bagus Oktori[1], Mukhlis[2]

[1] Politeknik Kelautan dan Perikanan Karawang, Karawang, Indonesia
[2] Agribusiness Study Program, Department of Agriculture Business, Politeknik Pertanian Negeri Payakumbuh, Lima Puluh Kota, Indonesia

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Corresponding Author:
Catur Pramono Adi
catur.adi@kkp.go.id

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Abstrak: This study aims to analyze the cost and revenue structure and evaluate the financial feasibility of the tilapia (*Oreochromis niloticus*) seed production (hatchery) business. The breeding stage is a crucial early phase in the aquaculture production cycle. The feasibility evaluation encompassed calculations of the Revenue to Cost Ratio (R/C), Break-Even Point (BEP), and Return on Investment (ROI). The method employed was a profitability analysis using revenue theory, applying the R/C, BEP, and ROI formulas to the business's cost and revenue data. The results indicate that from a technical and technological perspective, all operational requirements for the hatchery were met, including location suitability, operational scale, pond management, and resource utilization, supported by a single-level distribution system. Economically, the business showed profitability and business viability. The total revenue reached IDR 79,552,083. The financial analysis yielded an R/C ratio of 1.5, signifying that every Rp1 spent generated IDR 1.5 in revenue. The production break-even point (BEP) was achieved at 12,635,416 fish seeds. It is concluded that the tilapia seed production business is comprehensively feasible and profitable for further development.

Keywords: Financial Feasibility; Profitability Analysis; Break-Even Point

Introduction

Fish seeds are a key element in efforts to increase yields and improve the public perception of aquaculture. The guaranteed availability of seeds in terms of species, quantity, quality, size, timing, and price is crucial for the success of grow-out operations (Afriani, 2016). Hatchery activity is a fundamental initial stage; without superior and adequate seeds, subsequent grow-out activities cannot proceed smoothly (Saprianto, 2010; Ismail & Khumaidi, 2016; Ramadhan & Sari, 2019; Pomuri & Suhaeni, 2020). Specifically, the Nile tilapia (*Oreochromis niloticus*) hatchery business constitutes an essential component of aquaculture in Indonesia, serving as a supplier of quality seeds.

Despite its vital role, Nile tilapia hatchery operations often face technical and economic challenges. Technical challenges include the selection of superior broodstock, pond management, and pest and disease control. Economic challenges, on the other hand, involve high production costs and fluctuations in seed market prices (Lubis et al., 2021; Kambolong et al., 2023).

To address these issues, a business analysis approach that evaluates technical, economic, and financial feasibility is highly relevant. Analytical methods such as the Revenue to Cost Ratio (R/C Ratio), Break-Even Point (BEP), and Return on Investment

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(ROI) are standard tools used to measure efficiency and profitability (Susanti & Ariana, 2020).

Although feasibility analyses are often conducted, this research offers a specific novelty and holds high significance based on the company context.

The novelty of this study lies in the in-depth analysis of the implementation of integrated business and technical management standards at the level of a large and established company, namely PT. Suri Tani Pemuka (PT. STP) Karawang. (1) Industrial Scale Business Case Study: Most studies focus on small/medium-scale enterprises. This research specifically analyzes a hatchery business that has implemented sound technical and managerial standards (such as integrated broodstock, feed, and disease management) and regularly conducts cost and revenue analyses to ensure viability; (2) Focus on Sustainable Efficiency: The novelty here is not merely measuring instantaneous profitability but examining the *impact* of sustainable development strategies (technological innovation, human resource enhancement, product diversification) implemented by PT. STP to anticipate market and environmental changes.

This research is important for the following reasons: (1) Benchmark of Success: The financial and technical data from PT. STP can serve as a realistic benchmark for small and medium-scale Nile tilapia hatchery operators, providing empirical evidence of the R/C, BEP, and ROI achievable with optimal management practices; (2) Basis for Managerial Decision-Making: The detailed analysis of the cost structure, variable costs, and operational cash flow will provide precise managerial input for PT. STP itself to enhance production efficiency and identify areas requiring further innovation.

The purpose of this Final Internship Report is to determine the cost and revenue structure of the Nile tilapia hatchery business, as well as to evaluate the R/C Ratio, Break-Even Point (BEP), Return on Investment (ROI), variable costs, and operational cash flow of the hatchery.

Method

Time and Location

This research was conducted at PT from March 27, 2025, to April 30, 2025,. Suri TaniPemuka, Karawang.

Data Collection Methods

Interviews

Data regarding tilapia breeding activities was collected through systematic question and answer sessions with technical assistants. The questions asked included: 2) What is the size of the ponds used for tilapia breeding? 3) How much capital is required for one breeding production cycle? 4) What are the operational costs incurred for facility and infrastructure maintenance? 5) How many fish fry are typically produced in one breeding cycle? 6) What are the marketing and sales strategies for tilapia fry?

Observations

Observations were conducted through direct observation without using tools, focusing on business analysis activities in tilapia hatchery operations.

Literature Review

Data was obtained through a literature review, including SNI standards and related documents. Secondary data collected during the integration practice included general information about the practice location, company organizational structure, and previous aquaculture activity data.

Data Analysis

The data analysis methods used included profit analysis and feasibility analysis. Profit analysis was based on income theory. The formulas used included the Revenue to Cost Ratio (R/C), Break-Even Point (BEP), and Return on Investment (ROI).

Revenue to Cost Ratio (R/C)

$$\text{R/C Ratio} = \frac{Total\ revenue}{/Total\ cost} \quad (1)$$

Description:

Total Revenue: The total amount of income earned from the business.

Total Expenses: The total expenses incurred to run the business.

Interpretation of Results:

R/C *Ratio* > 1 : The business is profitable.

R/C *ratio* = 1 : The business is at the break-even point.

R/C *Ratio* < 1 : The business is operating at a loss.

Break-even point (BEP)

BEP is the point at which total revenue equals total costs, resulting in neither profit nor loss. BEP can be calculated in units or currency values.

Formula:

BEP (Units) = Fixed Costs / (Selling Price per Unit - Variable Cost per Unit) (2)

BEP (Rupiah) = Fixed Costs / (1 - (Variable Cost per Unit / Selling Price per Unit) (3)

Analysis:

BEP helps determine the minimum number of units that must be sold or the revenue that must be generated to cover costs. BEP is used to assess the risk and potential profit of a business.

Return on Investment (ROI)

$$\text{ROI} = \frac{Net\ Profit}{Investment} \times 100\% \quad (3)$$

Explanation:

A high ROI indicates a profitable investment.

A low or negative ROI indicates an unprofitable investment.. ROI is used to compare the returns of various investments.

Variable Costs

Variable costs are expenses that change depending on the production or activity level. The higher the production, the greater the costs.

$$\text{Total Variable Costs} = \sum (\text{Variable Cost per Unit} \times \text{Number of Units}) \quad (4)$$

Cash Flow

Cash flow is the inflow and outflow of money in a given period, such as monthly or annually.

$$\text{Cash Flow} = \text{Total Revenue} - \text{Total Expenses} \quad (5)$$

Result and Discussion

Operational Aspect

Technical aspects need to be considered because they involve calculations of tilapia spawning inputs and outputs in the form of goods and services based on actual production processes. Thus, other elements in business analysis can only function if technical analysis is carried out.

There are several vital points in the technical aspect, including: the location of the tilapia hatchery business, the production area, appropriate cultivation activities and technology, as well as the layout of the hatchery ponds and the materials used. For the preparation of breeding ponds at STP Karawang, this includes the preparation of prospective broodstock, pond drying, liming, irrigation, spawning, nursery, feeding, pest and disease control, as well as matters related to harvesting and post-harvesting.

Facilities

Facilities are all goods or tools used in a company's production process. Facilities can be tools or objects that provide specific functions to their users, where all types of facilities have their own functions and users adjust their needs to select and use the facilities that will be used in their business.

Table 1. Breeding Facilities at STP

Facility	Function	Image
Spoon	Catching larvae for counting	
Sieve	For harvesting larvae	
Rubber	For tying packaging	
Waring	For larval maintenance/larval shelter	
STP crumble feed	For larval feed	
Scales	For weighing broodstock before the spawning process	

Facilities

Infrastructure refers to all basic equipment that supports the operation of a business in its production process. Infrastructure is a key factor in the success of a business's production process, making it crucial to prioritize as the success of a business's production process is significantly influenced by the availability of infrastructure.

Table 2. Infrastructure for Breeding at STP

Facilities	Function	Image
Office	As a workplace for administrators, managers, and accountants.	
Hatchery	As a place for raising larvae to fry.	
Breeding pond	As a place for breeding and spawning.	
Feed storage	For storing feed.	

Marketing Aspect

Marketing aspects include everything used to understand consumer desires for a company's product. Marketing aspects applied in the tilapia hatchery business at PT Suri Tani Pemuka Rengasdengklok include product, price, place, and promotion.

Product

The tilapia fry produced by PT.STP is of the STP strain. This strain of tilapia has the advantage of being highly adaptable to environmental conditions, having sufficient tolerance to pests and diseases, and growing relatively quickly.

Price

The price of tilapia larvae produced at PT.STP is also relatively cheap, at 14 rupiah per fish. Meanwhile, the price of 1-2 cm fry is 11 rupiah per fish, and 2-3 cm fry is 20 rupiah per fish. The price of STP tilapia fry is relatively low, making it affordable for farmers and other *customers*. This is a positive factor that makes STP tilapia fry easy to market.

Location

The location of STP Nila fish seed production is a very important factor in the marketing mix because by using the correct production location, the products can be distributed and sold easily. PT. Suri Tani Pemuka Rengasdengklok is an STP Nila fish seed production facility located near the highway in Rengasdengklok. This facilitates product marketing because many farmers from distant areas purchase STP tilapia fry. With the highway, *customers* can easily pick up STP tilapia fry products via the highway. In addition, the location of PT. STP Rengasdengklok, which is close to residential areas, makes it easy for residents to obtain tilapia fry for cultivation.

Promotion

Promotion is a method used to market products produced by a company. Promotion can be done in two ways, namely through *online* and *offline* media. PT. Suri Tani Pemuka uses both *online* and *offline* promotion *methods. Offline* promotion is carried out by spreading information by word of mouth, meaning that several customers convey information about the availability of STP tilapia seeds at PT.STP Rengasdengklok. This information is conveyed to farmers and other customers, so that many consumers come to buy tilapia seeds. *Online* promotion is carried out using social media, namely *WhatsApp Business,* Instagram, and through the official website of PT. Suri Tani Pemuka. These *online* media promote tilapia seed products and introduce PT's business profile. Suri Tani Pemuka, which has a variety of superior fishery commodities.

Economic Aspect

Income Analysis

Income analysis aims to determine a business's financial profit level. It is a way to understand the final value of income obtained after deducting costs and other expenses incurred in the production process.

Production Facility Costs

There are 40 ponds used for breeding, including 15 ponds for broodstock, 15 ponds for spawning, and 10 ponds for nursery. These ponds are privately owned. The initial cost of constructing the 1.80-hectare broodstock pond was IDR 270,000,000, and the cost of the 0.60-hectare grow-out pond was IDR 60,000,000.

Table 3. Pond Construction Costs in Tilapia Breeding Operations

No	Description	Unit	Quantity	Pool Area (m²)	Total Cost	Depreciation Cost per Period
1	Main pool (1.80 hours)	Unit	30	18,000	270,000,000	11,250,000
2	Nursery Pond (1.60 hours)	Unit	10	16,000	60,000,000	2,500,000
Total cost					330,000,000	13,750,000

Based on Table 3, the total cost incurred for pond costs at the tilapia hatchery unit is IDR 330,000,000. With a price of around IDR 9,700 per m², the figure of IDR 330 million for 40 earthen ponds with a total area of 34,000 m² is reasonable and quite economical**.** This indicates good cost efficiency, especially if the quality of artistry and supporting facilities are adequate (Chilmawati et al., 2018; Pujautama et al., 2020; Handayani et al., 2019).

Table 4. Cost of Purchasing Fish Broodstock in Tilapia Fish Breeding Operations

Details	Unit	Quantity	Price (IDR/unit)	Total Cost (IDR/Period)
Fish broodstock	per fish	700	15,000	10,500,000
			Total Cost	10,500,000

Based on Table 4, it can be seen that the expenditure for purchasing broodstock is IDR 10,500,000 per period, with a total of 700 broodstock obtained. Based on Salsabila & Suprapto (2018); Huda et al (2021); Oktami et al (2024), the cost of purchasing broodstock is relatively low. In this breeding process, there are expenses in the form of production facility costs, which can be seen in Table 5.

Table 5. Production Facility Costs in Tilapia Fish Breeding Operations

No	Description	Unit	Amount	Price (IDR/unit)	Total Cost (IDR/Period)
1	Feed (30 kg)	Sack	7	470,000	3,290,000
2	Seed Feed (20 kg)	Sack	2	670,000	1,340,000
3	Plastic Packaging	Packaging	100	20,000	2,000,000
4	Ovagrow	Package	4	60,000	240,000
5	Squid Oil	liter	1	50,000	50,000
6	Fertra	Package	4	70,000	280,000
7	Oxygen	Tank	1	150,000	150,000
Total Cost					7,350,000

Table 5 shows the total cost incurred for production facilities in one period of Rp. 7,350,000 can be relatively cheap (Marini & Artika, 2018; Prayuginingsih & Ridho, 2018; Lubis et al., 2021)

Labor Costs

The tilapia seedling cultivation process lasts for two months, and 30 ponds require 12 workers who work 7 hours per day. The monthly salary for managing 30 ponds is IDR 5,000,000 for technicians, IDR 4,000,000 for assistant technicians, IDR 4,000,000 for administrators, and IDR 3,500,000 for daily workers. IDR 5,000,000 is allocated for managers and accountants. The total cost incurred to pay labor during the fish breeding process is IDR 55,000,000.

Table 6. Labor Costs in Tilapia Seed Production

No	Description	Number of Workers (people)	Labor Cost (per person)	Total labor cost (IDR/Period)
1	Technician	1	5,000,000	5,000,000
2	Assistant technician	2	4,000,000	8,000,000
3	Daily laborer	8	3,500,000	28,000,000
4	Administration	1	4,000,000	4,000,000
5	Manager	1	5,000,000	5,000,000
6	Accounting	1	5,000,000	5,000,000
Total Cost				55,000,000

Equipment and Depreciation Costs for 1 Harvest Season

Equipment is used in the tilapia seedling breeding process at PT Suri Tani Pemuka, with a calculated usage period of 3 years. The cost of this equipment is calculated based on a depreciation value of IDR 1,847,917, as listed in Table 7.

Table 7. Production Equipment Costs and Depreciation Value in Fish Breeding Operations

No	Description	Quantity (units)	Unit Price (Rp/unit)	Total Cost (Rp)	Useful Life (Period)	Depreciation Cost (Rp)
1	Water Pump	2	2,600,000	5,200,000	12	416,667
2	Serok	15	50,000	50,000	8	6,250
3	Hoe	5	100,000	500,000	8	62,500
4	Digital Scale	1	1,000,000	1,000,000	8	125,000
5	Bucket	10	10,000	100,000	8	12,500
6	Headlamp	4	100,000	400,000	8	50,000
7	Happa	25	500,000	12,500,000	20	625,000
8	Fiber	3	5,000,000	15,000,000	30	500,000
9	Waring	2	500,000	1,000,000	20	50,000
Total Depreciation Cost						1,847,917

Table 7 shows that the fish tank is the most significant equipment cost for production facilities, with the highest depreciation value of IDR 625,000. Other significant expenses include purchasing water pumps, flashlights, and digital scales. Meanwhile, minor expenses include the purchase of scoops, hoes, waring, and buckets. The economic life value is determined based on interviews with the foreman responsible for the pond. In 4 periods, the economic life is 1 year, so if the economic life of a water pump is 3 years, then its power will last for 12 periods.

Total Production Costs

The total cost of production includes all fixed and variable costs. The total production cost for the tilapia fry supply business reached IDR 88,447,917, with details listed in Table 10. According to Table 10, the largest costs in the total production expenses for tilapia seedling production come from worker wages and parent pond rental costs. Smaller expenses include production facility costs and equipment usage costs.

Table 8. Total Production Costs for Tilapia Fry Production

No	Description	Total production cost (Rp/period)
1	Pond Cost	13,750,000
2	Parent Purchase Cost	10,500,000
3	Production Facility Costs	7,350,000
4	Labor Costs	55,000,000
5	Equipment Usage Costs	1,847,917
Total Costs		88,447,917

Table 8 shows that the total production cost of the tilapia hatchery at STP Karawang is lower than that described by (Iskandar et al., 2021; (Iskandar, Nurfauziyyah, et al., 2021).

Profit Analysis

Profit from Nile tilapia hatchery production is obtained by subtracting production value from total costs incurred. If production value exceeds total costs, the hatchery business will generate a profit. However, the business will incur a loss if production value is lower than total costs. For further clarification, the use of production costs, production value, and income from Nile tilapia hatchery can be seen in Table 9 below:

Table 9. Profit Analysis per Period

Description	Unit	Value
Production Quantity	heads	12,000,000
Production Price	IDR/head	14
Production Output Price	IDR /(18,000 m²)	168,000,000
Total Production Cost	IDR /(18,000 m²)	88,447,917
Profit	IDR /(18,000 m²)	79,552,083

Based on Table 9, during the practice period, 12,000,000 larvae were produced from an area of 18,000 m², with a selling price of IDR 14 per larva, generating revenue of IDR 168,000,000, and the total production costs of IDR 87,047,917. Thus, the net income from the hatchery business during one month of practice is IDR 79,552,083.

Based on the annual cash flow, the net cash flow in each cycle is stable, indicating good value, so the business can grow without additional debt.

Feasibility Analysis

The financial feasibility study aims to ensure the business is financially viable (Aisyah *et al*., 2021). If the production costs are comparable to the revenue, then the company is in a balanced condition. To evaluate the feasibility level of the tilapia seedling breeding business, the author uses R/C Ratio analysis, BEP (Break-Even Point) analysis, and ROI (Return on Investment) analysis, which can be seen in Table 10.

Table 10. Feasibility Analysis

Description	Value
R/C *Ratio* Analysis	1.5
Break-Even Point Analysis	
a. Production BEP	12,635,416
b. Price BEP	IDR 21
ROI (*Return on Investment*) Analysis	47
Total Production	12,000,000
Total Production Value	168,000,000

Based on Table 10, it is clear that the tilapia hatchery business at PT. TSP is feasible with an R/C ratio of 1.5, because an R/C ratio > 1 indicates that the business is feasible to develop. This is in line with the research results of (Mustika, 2022; Rahmadiah et al., 2023), that tilapia hatchery cultivation is efficient to run with an R/C ratio greater than 1.

R/C Ratio Analysis

$$RC\ Ration = \frac{140.000.000}{88.447.917} = 1{,}5$$

The R/C ratio obtained is 1.5, meaning that the seedling business at PT. Suri Tani Pemuka is viable. According to Ekonomi *et* al. (2024, **if R/C > 1**, the business is viable; if **R/C < 1**, the business is unprofitable.

Break-even Point

$$BEP\ produksi = \frac{88.447.917}{14 - 7} = 12.635.416$$

The production BEP results obtained show a value of 12,635,416 heads, which means that at least 12,635,416 heads must be sold for the business to break even (Ekonomi et al., 2024).

Price BEP

$$BEP\ harga = \frac{88.447.917}{12.000.000} + 14 = 21$$

From the price BEP results obtained, the value is 21, meaning that the selling price must be 21 per head for the business not to incur losses (Wowor et al., 2016; Sambuaga et al., 2017; Syahputra & Wicaksana, 2022).

ROI (Return On Investment)

$$ROI = \frac{79.552.083}{168.000.000} x\ 100\% = 47\%$$

The ROI (*Return on Investment*) obtained is 47%, meaning that the business generates a profit of 47% (Zakaria et al., 2017; Prayuginingsih & Ridho, 2018; Lubis et al., 2021).

Variable Costs

Parent purchase cost = IDR 10,500,000
Production facility costs = IDR 7,350,000
Labor wages = IDR 55,000,000

Total Variable Costs = IDR 10,500,000 + IDR 7,350,000 + IDR 55,000,000
= IDR 72,850,000

From these calculations, the variable costs obtained are IDR 72,850,000. Variable costs are obtained from the sum of raw material purchase costs, production facility costs, and labor costs (Sudana et al., 2013; Julpano et al., 2021; Lubis et al., 2021).

Cash Flow
Total Rvenue:
Sales of 12,000,000 heads × IDR 14/head = IDR 168,000,000

Total Expenses:
Variable costs = IDR 72,850,000
Pool costs = IDR 13,750,000
Equipment usage costs = IDR 1,847,917

Total Expenses = IDR 72,850,000 + IDR 13,750,000 + IDR 1,847,917
= IDR 88,447,917

Net Cash Flow:
Revenue = IDR 168,000,000
Expenses = IDR 88,447,917

Net *Cash Flow* = IDR 168,000,000 – IDR 88,447,917
= IDR 79,552,083

From these calculations, the net cash flow obtained is Rp79,552,083. Net cash flow is generated from the reduction between income (production volume multiplied by production costs) and expenses (the sum of variable costs, pond costs, and equipment usage costs) during the production process (Yuniarti & Basuki, 2017; (Aisyah et al., 2021; Syahputra & Wicaksana, 2022).

Conclusion

The comprehensive analysis of PT. STP Karawang confirms the high profitability achieved through the optimal integration of technical and financial management, yielding the following specific findings: (1) Superior Financial Feasibility: The Nile tilapia hatchery business generated a total net revenue (profit) of IDR 79,552,083 per period with an initial investment of IDR 88,447,917. Key feasibility indicators show robust figures: (a) R/C Ratio = 1.5: This value is well above the feasibility threshold (R/C > 1), indicating that every Rupiah of cost incurred generates significant profit; (b) ROI = 47%: This high percentage of Return on Investment confirms that the capital invested in the tilapia seed production business is managed very efficiently, providing a fast and substantial return.

Low Break-Even Point (BEP): The production BEP of 12,635,416 fish seeds and the price BEP of Rp. 21/fish indicate that operational loss risk can be effectively managed, given the actual production volume reaching 12,000,000 fish (which is very close to the BEP) supported by competitive selling prices. Generalization of Technical-Economic Viability: The achieved financial feasibility can be attributed to the company's adherence to sound technical and managerial standards (*Good*

Aquaculture Practices). This includes superior broodstock management, water quality control, and the implementation of a single-level distribution system. This finding generalizes that high success and profitability in the tilapia hatchery business are strongly dependent on the optimization of strict technical management.

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The authors declare no conflict of interest.

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