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FINANCIAL ANALYSIS OF NILEM FISH FARMING IN CIAMIS REGENCY, WEST JAVA PROVINCE

Analisis Finansial Usaha Budidaya Ikan Nilem di Kabupaten Ciamis, Provinsi Jawa Barat

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ABSTRACT

Sustainability of aquaculture enterprises requires not only good technical cultivation practices but also robust financial feasibility analysis. This study aims to analyze the financial feasibility of Nilem (*Osteochilus hasselti*) farming in Ciamis Regency, West Java. The research was conducted in Cipaku Sub-district, with ten aquaculture farmers selected by purposive sampling. Financial feasibility was assessed using indicators: Revenue/Cost (R/C) ratio, Break-Even Point (BEP), Payback Period, and Return on Investment (ROI). The results showed an R/C Ratio of **2** (R/C > 1), indicating that every one rupiah of cost generated two rupiahs of revenue, hence the enterprise is operationally feasible. Sales of 13,175 fish yielded revenue of Rp 1,054,000, exceeding the BEP in unit (3,819 fish) and in rupiahs (Rp 305,362), illustrating that the operation has surpassed the break-even point and is profitable. The ROI was recorded at 16 % per production cycle. Based on these three indicators, it can be concluded that Nilem aquaculture in Ciamis Regency is financially feasible and profitable. For sustainability and business development, it is recommended to conduct sensitivity analyses on fluctuations in cost and price, as well as further studies on larger-scale operations to enhance both sustainability and efficiency.

Keywords: Aquculture, Break-Even Point, R/C Ratio, Sustainability

ABSTRAK

Keberlanjutan usaha budidaya tidak hanya diperlukan aspek teknis budidaya yang baik, tetapi juga analisis kelayakan finansial. Penelitian ini bertujuan untuk menganalisis kelayakan finansial usaha budidaya ikan Nilem di Kabupaten Ciamis. Penelitian ini dilaksanakan di Kecamatan Cipaku dengan responden sebanyak 10 pembudidaya yang dipilih secara *purposive sampling*. Kelayakan finansial dianalisis menggunakan indikator R/C ratio, Break-Even Point (BEP), *Payback Period* serta Return on Investment (ROI). Hasil perhitungan menunjukkan bahwa R/C Ratio sebesar 2 (R/C > 1) mengindikasikan bahwa setiap satu rupiah biaya menghasilkan 2 rupiah penerimaan, sehingga usaha secara operasional layak untuk dilanjutkan. Selanjutnya, penjualan sebanyak 13.175 ekor menghasilkan pendapatan sebesar Rp 1.054.000, yang melebihi BEP unit (3.819 ekor) dan BEP rupiah (Rp 305.362), yang menunjukkan bahwa

usaha telah melampaui titik impas dan menguntungkan. Tingkat pengembalian investasi tercatat sebesar 16 % per siklus produksi. Berdasarkan ketiga indikator tersebut, dapat disimpulkan bahwa usaha budidaya ikan Nilem di Kabupaten Ciamis secara finansial layak dan menguntungkan. Untuk keberlanjutan dan pengembangan usaha, perlu dilakukan analisis sensitivitas terhadap fluktuasi biaya dan harga, serta kajian lanjutan untuk skala usaha yang lebih besar agar keberlanjutan dan efisiensinya semakin meningkat.

Kata Kunci: Budidaya Ikan, Keberlanjutan, R/C Ratio, Titik Impas

INTRODUCTION

Freshwater aquaculture is one of the agribusiness alternatives that has the potential to increase income and promote economic equity in rural areas of Indonesia. Among local freshwater fish species, Nilem fish (*Osteochilus hasselti*) is recognized as a commodity with biological advantages and promising aquaculture prospects. Nilem fish (*Osteochilus vittatusi*) is a species that is widely found in the West Java region and has high potential to be developed as a leading aquaculture fisheries product. Nilem fish aquaculture, from the perspectives of economic benefits, environmental sustainability, and production, can be profitable (Firdaus & Hamdani, 2017).

At present, Nilem fish are exploited not only for their meat but also for their eggs. The eggs are highly favored by the community due to their delicious taste and can be exported to certain countries as a substitute for caviar. In addition, Nilem eggs are also utilized as raw material for sauce production. Similarly, fish weighing 5 grams that are ready for consumption, popularly referred to as baby fish, are also widely favored (S. Y. Rochmatin, A. Solichin, 2014). Nilem fish possess several advantages, namely being palatable for consumption: Nilem fish have savory meat and eggs while also containing good nutritional value for health. Nilem fish are easy to culture due to their ability to adapt to various aquatic environments, making them resistant to disease and a preferred choice for freshwater aquaculture development.

Nilem fish aquaculture offers benefits both economically and in terms of environmental sustainability. This species is categorized as an economically valuable fish. In terms of price, Nilem fish are very affordable for the community and are particularly favored in the West Java region. Nilem fish feed on algae, classifying them as herbivorous fish. Another advantage from an environmental sustainability aspect is that this commodity can function as a natural cleaner due to its feeding habits (Pranowo *et al.*, 2024). The fisheries sector in one of the regions in West Java, namely Ciamis Regency, has considerable fisheries potential. Total aquaculture fisheries production reached 990,764 tons, and Ciamis Regency contributed 51,626 tons (Sari *et al.*, 2019).

Based on data from the Ciamis Regency Fisheries Service, Nilem fish production has fluctuated in recent years. In 2019, production peaked at 7,280.15 tons. However, there was a significant decline in 2020 to 1,795.98 tons. Since then, production has shown an increasing trend, reaching 1,849.86 tons in 2021, 1,976.09 tons in 2022, and 2,059.95 tons in 2023. Observing the increasing production trend and high demand, the development of Nilem fish aquaculture in Ciamis has promising prospects. Efforts to increase local production can help meet market demand and reduce dependence on supplies from outside the region. Cipaku District, located in Ciamis Regency, West Java, has great potential for the development of Nilem fish aquaculture. With a high freshwater fish population, Cipaku District has become one of the main production centers in West Java.

Based on data from the Ciamis Regency Fisheries Service, the freshwater fisheries sector contributes a significant portion to the local economy, including the Nilem fish commodity. Nilem fish aquaculture in Cipaku is supported by good market potential, stable demand, and suitable aquatic environmental conditions. However, a challenge faced is the relatively long

culture period of Nilem fish. Considering its potential, it is important to analyze Nilem fish aquaculture in terms of cultivation techniques and business management. This approach will not only increase productivity but also enhance the competitiveness of Nilem fish as a leading local commodity capable of competing in national and international markets. Innovations such as masculinization technology and local community empowerment are also important elements in encouraging the successful development of this commodity. The development of Nilem fish aquaculture in Cipaku can be enhanced through the application of more planned and efficient cultivation techniques and management. Techniques such as superior broodstock selection, water quality management, and innovations in feeding practices can increase hatchery productivity. In addition, the application of business management involving production planning, resource organization, implementation of measurable activities, and periodic evaluation will drive business success. With adequate technical and managerial support, Nilem fish can become a leading commodity that not only supports the local economy in Cipaku but also contributes to environmental sustainability and competitiveness in national and international markets. Innovations such as masculinization technology and local community empowerment will be important elements in supporting the successful development of Nilem fish as a strategic commodity.

Nevertheless, to ensure the sustainability of aquaculture enterprises, not only sound technical cultivation aspects are required, but also adequate financial feasibility analysis. Therefore, based on the description above, the objective of this study is to analyze the financial aspects of Nilem fish aquaculture to determine the feasibility of the Nilem fish farming business.

METHODS

This study was conducted from February to March 2025 in Ciamis Regency, West Java Province. The research location was selected because it is a production center for Nilem fish in West Java. The sampling technique used was non-probability sampling, namely purposive sampling, to select Nilem fish farmers as respondents. The number of Nilem fish farmers who served as respondents in this study was 10 individuals.

The data used in this study consisted of primary data and secondary data. Primary data were obtained from field observations and interviews with fish farmers. Secondary data were obtained from relevant institutions and literature studies.

The data analysis method in this study was calculated or analyzed using aquaculture business income analysis and investment feasibility analysis. The calculation of costs, revenues, and income of the aquaculture business in this study was carried out using the following formula:

A. Total cost is the cost incurred to produce output.

$$\text{Total Cost (TC)} = \text{TFC} + \text{TVC}$$

TFC (Total Fixed Cost) is the cost incurred by farmers that does not affect production results. Regardless of the amount of output produced, fixed costs remain the same.
Total Variable Cost (TVC) is the cost whose amount changes with the amount of output produced.

B. Total Revenue is the amount of income received by farmers obtained from the production level multiplied by the price level. Mathematically, Total Revenue (TR) is formulated as follows:

$$\text{TR} = \text{P x Q}$$

C. Revenue is the difference between revenue and costs

$$\text{Revenue} = \text{TR} - \text{TC}$$

Revenue Cost Ratio (R/C) analysis is an analytical tool for determining a business's relative profit relative to its costs in a year (Sajari *et al*., 2017). The R/C ratio is calculated using the following formula:

$$\frac{R}{C}\ ratio = \frac{Total\ income}{Total\ cost}$$

The criteria used in R/C ratio analysis are:

- If the R/C ratio is > 1, the business is considered feasible and profitable.
- If the R/C ratio is < 1, the business is considered unfeasible and unprofitable.
- If the R/C ratio is 1, the business is declared break-even (neither profit nor loss).

Break Event Point (BEP) analysis is an analytical tool to determine the limit of production value or volume at which a business reaches the break-even point (neither profit nor loss). The break-even point indicates that the production level has generated revenue equal to the production costs incurred (Heru Maruta, 2015). The BEP calculation is based on the following formula:

$$BEP\ Rupiah = \frac{Fixed\ Costs}{1 - \frac{Variable\ Cost\ per\ Unit}{Selling\ Price\ per\ Unit}}$$

$$BEP\ Unit = \frac{Total\ Fixed\ Costs}{Selling\ Price\ per\ Unit - Variable\ Cost\ per\ Unit}$$

The payback period is the length of time required to recoup capital or investment, calculated from net cash flow. Net cash flow is the difference between revenue and expenses per year. The payback period is usually expressed in annual terms (Sujatmiko *et al*., 2023).

$$Payback\ Period = \frac{Initial\ investment}{Profit}\ x\ 1\ year$$

Return On Investment (ROI) is a ratio that measures a company's ability to generate profits by using the total assets (wealth) owned by the company after adjusting for the costs of financing these assets (Sunarka *et al*., 2019).

$$ROI = \frac{Profit}{Investment}\ x\ 1\ year\ x\ 100\%$$

The financial analysis of the Nilem fish farming business was analyzed using quantitative methods with the help of Microsoft Excel.

RESULTS

Respondent Characteristics

The characteristics of the respondents in this study were used to obtain a general overview of the conditions and backgrounds of the sample farmers. Based on data obtained in the field, the characteristics of the respondents in this study are as shown in Table 1.

Table 1. Respondent characteristics

Description	Unit	Mark
Number of sample farmers	Person	10
Average age	Year	51
Highest education level	Year	12
Average number of dependents	Person	2
Average business experience	Year	5
Average land area	m^2	60

Financial Analysis of Nilem Fish Cultivation Business

This analysis focuses on the Nilem fish hatchery business, with a production cycle of 2.5 months, or 85 days. This period encompasses all stages of production, from spreading larvae to harvesting ready-to-sell fry, designed to optimize efficiency and yield within this timeframe.

Nilem Fish Cultivation Costs

The Nilem fish cultivation costs referred to in this study are the total costs incurred by fish farmers in running the business. Costs are categorized as fixed and variable.

a. a. Fixed Costs: costs incurred routinely and not affected by production or sales levels. Fixed costs with an average land area of 60 m^2 include electricity and fuel costs amounting to Rp 216,197 per production cycle.
b. b. Variable Costs: costs incurred by farmers directly related to the production process. These expenses can vary depending on the volume of cultivation activities. The variable cost components are detailed in Table 2 below.

Table 2 Variable Costs

Product Name	Qty	Unit	Unit price	Total Price
Urea Fertilizer	0,5	kg	Rp. 2.000	Rp. 4.000
Manure	40	kg	Rp. 500	Rp. 20.000
PF500 Feed	5	kg	Rp. 22.000	Rp. 110.000
PSP Feed	6	kg	Rp. 22.000	Rp. 132.000
Eggs	1	kg	Rp. 1.687	Rp. 27.000
Ovaprim	0,2	ml	Rp. 1.600	Rp. 6.400
Sodium Chloride	2,8	ml	Rp. 24	Rp. 67
Plastic Packaging	2	unit	Rp. 3.500	Rp. 7.000
Rubber Bands	4	unit	Rp. 35	Rp. 140
Oxygen Gas	1		Rp. 2.000	Rp. 2.000
TOTAL			Rp. 55.346	Rp. 308.607

Revenue

Revenue from Nilem fish farming in Ciamis Regency is obtained by multiplying the number of fish produced by the price of fingerlings per fish. The average production of Nilem fish fingerlings during one production cycle is 13,175 fish. The average price of fingerlings is

IDR 80 per fish. Therefore, the average revenue earned by Nilem fish farmers in Ciamis Regency during one production cycle is IDR 1,054,000

Income

Income is calculated based on the difference between revenue and costs. The average revenue received by Nilem fish farmers during one production cycle is IDR 529,196, as calculated below.:

Income = TR - TC
= Rp. 1.054.000 – Rp. 524.804
= Rp. 529.196

Revenue / Cost (R/C) Ratio

The RC ratio is used to determine the viability of a business by comparing the level of income earned with the capital required. The results of the R/C ratio calculation are as follows:

R/C ratio = TR / TC
= Rp. 1.054.000 / Rp. 524.804
= 2,0

Break Event Point

The break-even point is where total revenue equals total cost. The break-even point indicates that the production level has generated revenue equal to the production costs incurred.

$$\text{BEP Rupiah} = \frac{fixed\ costs}{1 - \frac{variable\ costs}{selling\ price}}$$

$$= \frac{216.197}{1 - \frac{308.607}{1.054.000}}$$

$$= \frac{216.197}{1 - 0{,}292} = \frac{216.197}{0{,}708} = \text{Rp. } 305.362$$

$$\text{BEP Unit} = \frac{fixed\ costs}{selling\ price - \frac{TVC}{Q}}$$

$$= \frac{216.197}{1 - \frac{308.607}{1.054.000}}$$

$$= \frac{216.197}{1 - 0{,}292} = \frac{216.197}{0{,}708} = 3819 \text{ tail}$$

Payback Period

Payback period is the period of time required to return capital or investment, calculated from net cash flow.

$$PP = \frac{Initial\ Investment}{Profit}\ x\ 1\ year = \frac{3.142.146}{2.116.184}\ x\ 1\ year = 1 \text{ year, } 4 \text{ month}$$

Based on the Payback Period calculation, the investment costs in the Nilem fish hatchery business will be recovered through profits after 1 year and 4 months.

Return on Investment (ROI)

ROI is the profit earned by an entrepreneur from each amount of money invested over a specific time period.

$$\text{ROI} = \frac{Profit}{Investment}\ x\ 100\ \% \quad = \quad \frac{529.196}{3.142.146}\ x\ 100\ \%$$

$$= \quad 16\ \%$$

DISCUSSION

Based on Table 1, it is known that the average age of Nilem fish farmers is 51 years, which means that the age of the respondents falls within the productive age category that allows farmers to manage their aquaculture businesses effectively. This condition is also supported by the length of business operation or aquaculture experience, which averages 5 years, indicating that farmers already have sufficient experience in operating fish farming businesses, with an average land ownership of 60 m². This experience enables farmers to manage their businesses properly, thereby increasing income from Nilem fish aquaculture activities.

The average length of education of the farmers is 12 years, equivalent to senior high school level. Education can influence fish farmers in adopting technology, generating ideas, and developing skills in business management. Higher levels of education allow business actors to be more dynamic and more receptive to new innovations (Nurhayati & Herawati, 2018).

The number of family dependents refers to the number of individuals within the household management other than the head of the household. The number of family dependents affects household living expenses and influences the amount of labor that can participate in the business, as well as being related to the amount of costs incurred for daily necessities borne by the household. The greater the number of family members, the greater the financial burden incurred. The average number of dependents of business actors is 2 persons.

Financial Feasibility of Nilem Fish Aquaculture Business

The financial feasibility of fish aquaculture businesses is very important to determine whether the business is not only technically feasible but also economically capable of providing sufficient returns for business actors. Several commonly used indicators include the revenue-to-cost ratio (R/C Ratio), break-even point (BEP), return on investment (ROI) or return to capital (RTC), as well as long-term indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), and pay-back period (Chamdhani *et al.*, 2025). In the context of fish hatchery activities, the use of R/C > 1 as an initial feasibility criterion has been widely applied, for example in fish farming studies where R/C > 1 indicates that revenues exceed costs (Setyono *et al.*, 2020).

Based on the calculation results of the obtained data, the R/C Ratio is 2, meaning that for every Rp 1.00 of cost incurred, revenue of Rp 2.00 is obtained. Since the R/C value is greater than 1, this indicates that the business is operationally feasible to continue (revenues exceed costs) (Chamdhani *et al.*, 2025; Jamil *et al.*, 2022; Nabilah *et al.*, 2015). In this study, because R/C = 2, it indicates that the revenue margin is sufficiently large compared to costs, which is a positive signal that the Nilem fish aquaculture business has good cost efficiency or adequate revenue. Similar studies conducted by (Kusumaningrum, 2021; Nashrullah *et al.*, 2023; Yanuar *et al.*, 2022) show that business feasibility is measured by an R/C ratio greater than 1. Although the commodities differ, as long as costs are lower than revenues, the business is categorized as financially profitable.

The break-even point indicates the minimum production volume or revenue that must be achieved for the business to avoid losses, where total revenue equals total costs. The Nilem fish aquaculture business has successfully exceeded the break-even point (BEP). Sales of 13,175 fish generating revenue of Rp 1,054,000 indicate profit because this figure exceeds both the BEP unit (3,819 fish) and the BEP value (Rp 305,362). These values have surpassed the BEP in terms of both production volume and monetary value. This indicates that the business has been operating effectively and has generated profit after covering fixed and variable costs.

The achievement of the BEP is an important requirement to demonstrate that the business is not in a loss zone (Intyas *et al.*, 2019).

From the above calculations, the return on investment of the Nilem fish hatchery business activity is 16% per cycle. This figure indicates that the invested capital generates a return of 16% within one production cycle. Although the literature does not always specify a particular ROI value for Nilem fish hatcheries, other fish farming studies, such as catfish culture with an ROI of approximately 15.98%, are also considered feasible (Asyifa Anandya *et al.*, 2023; Chamdhani *et al.*, 2025).

The results of the financial analysis above (R/C > 1, exceeding BEP, ROI 16%) overall indicate that the Nilem fish aquaculture business is financially feasible to be continued or expanded. Cost efficiency and adequate revenue (R/C = 1.4) indicate that the production and marketing scheme has successfully generated good margins. The achievement of BEP signifies that the risk of loss is relatively low at present, and the business has entered a profit zone. An ROI of 16% provides economic incentives for business actors or investors to consider business sustainability or expansion. These financial analysis indicators are also used in other sectors to assess business feasibility, as shown in studies conducted by (Asmaida, 2018; Darman *et al.*, 2015; Nurmalina, 2008; Sujatmiko *et al.*, 2023; Wardono & Prabakusuma, 2016).

CONCLUSION

Based on the results of the financial analysis, it can be concluded that the Nilem fish aquaculture business with R/C = 1.4, BEP unit = 3,819 fish, and BEP value = Rp 305,362, as well as realized sales of 13,175 fish generating revenue of Rp 1,054,000, has proven to be operationally and financially feasible. A return on investment of 16% per cycle indicates that this business is not only feasible but also profitable. However, to ensure sustainability and potential business development, further analysis of costs, production duration, production scale, and external risks through sensitivity analysis or further research is required.

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