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BUSINESS ANALYSIS OF GIANT TREVALLY (*Caranx* sp.) CULTIVATION USING A FLOATING NET CAGE SYSTEM IN THE WATERS OF LAUTAKA HAMLET, BANDA NEIRA, CENTRAL MALUKU

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ABSTRACT

This study aimed to analyze the technical performance and economic feasibility of giant trevally (*Caranx* sp.) cultivation using a floating net cage (FNC) system in the waters of Lautaka Hamlet, Banda Neira, Central Maluku. The study was conducted for two months, from November to December 2025, using observation, interviews, documentation, and literature review to collect technical and economic data. The data were analyzed descriptively. The cultivation system used three traditional floating net cage compartments, each measuring 3 × 2 × 2 m, with a stocking density of 250 fish per compartment. The fish were fed trash fish at approximately 40 kg day^{-1}. The survival rate was 83%, feed conversion ratio (FCR) was 1.2, and specific growth rate (SGR) was 0.59% day^{-1}. Total production cost was Rp 18,540,000, while total revenue reached Rp 25,800,000, resulting in a profit of Rp 7,260,000 per production cycle. The reported Return Cost Ratio (RCR) was 1.3, indicating that the enterprise was economically feasible. The reported payback period was 2.5 years, while the break-even point (BEP) was 309 fish. Overall, giant trevally cultivation using the FNC system in Lautaka Hamlet has potential for development as a sustainable source of income for coastal communities, provided that technical and financial management is improved.

Keywords: *business analysis; giant trevally; Caranx* sp.*; floating net cage; economic feasibility*

INTRODUCTION

Indonesia is an archipelagic country with substantial marine resource potential. One important way of utilizing this potential is through fisheries aquaculture, particularly marine aquaculture (Sugiarto & Sari, 2010). Giant trevally (*Caranx* sp.) is a marine fish with high economic value and relatively stable market demand. The species is also considered tolerant of a range of marine environmental conditions and can therefore be cultivated using floating net cage (FNC) systems, which are widely used in archipelagic areas, including Maluku (Nurdjana, 2006).

Giant trevally has several advantages as a marine aquaculture commodity, including strong market demand, relatively rapid growth, competitive selling prices, adaptability to clean marine

waters with moderate currents, and relatively high environmental tolerance. However, cultivation is constrained by the limited availability of quality seed, high feed requirements associated with its predatory feeding habit, and susceptibility to stress when water quality deteriorates rapidly.

Initial investment is one of the major factors affecting marine fish farming using FNC systems, particularly the cost of constructing cage units. Investment costs influence production scale, efficiency, and the sustainability of the enterprise. Traditional FNCs are commonly constructed from locally available materials such as bamboo, timber, and simple nets, making them relatively affordable for coastal communities. However, their service life is generally shorter because the materials are vulnerable to waves, currents, and biological deterioration. Modern FNCs use more durable materials, such as high-density polyethylene (HDPE) pipes for floating frames and UV-resistant synthetic nets, but their construction costs may be substantially higher (Zatnika, 2009).

The success of marine fish farming is determined not only by technical performance but also by economic performance. Therefore, an enterprise analysis covering production costs, revenue, profit, and efficiency is required to determine the feasibility of cultivation for local communities. Based on this consideration, this study analyzed the cultivation of giant trevally using a floating net cage system in Lautaka Hamlet, Banda Neira, Central Maluku.

MATERIALS AND METHODS

The study was conducted for two months, from November to December 2025, at a floating net cage located in Lautaka Hamlet, Merdeka Village, Banda District, Central Maluku Regency. The study focused on the technical and economic characteristics of giant trevally cultivation conducted by a local farmer. The research location is presented in Figure 1.

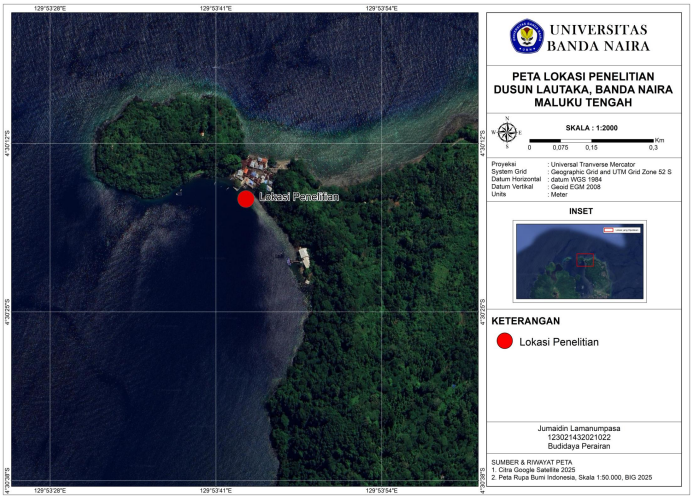


Figure 1. Research Location Map

Primary data were collected through direct observation and interviews with the farmer. Documentation was used to record production activities and supporting information. Secondary information was obtained through production records, financial notes, fisheries agency references, scientific articles, and other relevant literature.

Table 1. Cultivation Characteristics

Parameter	Description
FNC type	Traditional
Cage compartment size	3 × 2 × 2 m
Number of compartments	3
Seed source	Wild-caught
Initial seed size	Approximately 8 cm; 55.6 g
Stocking density	250 fish per compartment
Feed	Trash fish
Feed input	40 kg day^{-1}
Feeding frequency	Once daily
Culture period	12 months
Average harvest weight	0.4 kg $fish^{-1}$
Harvest production	430 kg

The technical indicators evaluated were stocking density, feed input, survival rate (SR), feed conversion ratio (FCR), and specific growth rate (SGR). Stocking density refers to the number of fish stocked in a cage compartment or fish biomass per unit volume. Feed input was calculated from the amount of feed provided, feeding frequency, and culture duration.

Survival rate was calculated as the percentage of fish surviving at the end of the culture period relative to the number stocked. FCR was used to describe the amount of feed required to produce one unit of fish biomass. SGR was expressed as the percentage increase in body weight per day based on the initial and final body weights.

Economic Analysis

Economic analysis included total production cost (TPC), total revenue (TR), profit, Return Cost Ratio (RCR), payback period (PP), and break-even point (BEP). Total production cost was calculated as the sum of fixed and variable costs:

$$TPC = Fixed\ Cost + Variable\ Cost$$

Total revenue was calculated as:

$$TR = Selling\ Price\ per\ kg \times Total\ Production\ (kg)$$

Profit was calculated as:

$$Profit\ (\pi) = TR - TPC$$

RCR was used as an indicator of economic efficiency by comparing total revenue with total production cost. An RCR greater than 1 indicates that revenue exceeds cost. Payback period was used to estimate the time required to recover the initial investment. BEP was used to identify the minimum production or sales level required for the enterprise to cover its costs.

Data Analysis

The data were processed using Microsoft Excel and analyzed descriptively. A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was also used to identify internal and external factors affecting the development of the cultivation enterprise.

RESULTS AND DISCUSSION

The cultivation operation used a stocking density of 250 fish per cage compartment and approximately 40 kg of feed per day. The survival rate reached 83%, indicating that most stocked fish survived until harvest. The FCR of 1.2 indicates relatively efficient feed utilization, while the SGR of 0.59% day^{-1} indicates continuous growth during the culture period (Table 2).

Table 2. Technical Performance

Technical parameter	Result
Stocking density	250 fish
Feed input	40 kg day^{-1}
Survival rate	83%
Feed conversion ratio	1.2
Specific growth rate	0.59% day^{-1}

The fixed capital consisted mainly of floating cage materials, including floats, bamboo, timber and boards, zinc sheets, nails, polyethylene rope, and nets. The reported fixed capital amounted to Rp 12,670,000. Working capital consisted of seed, feed, transportation, and labor costs, with a reported total of Rp 5,870,000 (Table 3).

Table 3. Economic Performance

Economic parameter	Result
Total production cost	Rp 18,540,000
Total revenue	Rp 25,800,000
Profit	Rp 7,260,000
Return Cost Ratio (RCR)	1.3
Payback period	2.5 years
Break-even point	309 fish
Break-even value	Rp 25,800,000

The stocking density of 250 fish per compartment represented the production intensity applied by the farmer. Appropriate stocking density is important because excessive density may increase competition for space, feed, and dissolved oxygen and may negatively affect growth and survival. The survival rate of 83% indicates that the culture system was able to maintain most of the stocked fish until harvest. In practical aquaculture operations, survival is influenced by fish adaptation, water quality, feeding management, stocking density, and disease control.

Feed input was approximately 40 kg day^{-1}, reflecting intensive feeding management. Feed quantity alone, however, does not determine feeding efficiency. Feed quality, feeding practices, fish size, environmental conditions, and physiological requirements must also be considered. The FCR of 1.2 indicates that approximately 1.2 kg of feed was required for each kilogram of fish biomass gain. Lower FCR values generally indicate more efficient feed utilization.

The SGR of 0.59% day^{-1} indicates that fish biomass increased consistently during the culture period. Growth is affected by feed availability and quality, water quality, stocking density, and fish physiological condition. Consequently, regular monitoring of feeding performance and environmental conditions is important for maintaining production efficiency.

The total production cost of Rp 18,540,000 represented the reported expenditure associated with the production cycle, including fixed and variable components. Total revenue reached Rp 25,800,000 from the sale of 430 kg of harvested fish at a reported selling price of Rp 60,000 kg^{-1}. The resulting profit was Rp 7,260,000 per cycle. These figures indicate positive economic returns under the conditions observed in the study.

The reported RCR of 1.3 means that each rupiah of cost generated approximately Rp 1.30 in revenue. An RCR greater than 1 indicates that the enterprise generates revenue exceeding production costs and is therefore economically feasible. The reported payback period of 2.5 years indicates that the initial investment could be recovered in approximately two and a half years under the stated assumptions.

The BEP analysis provides a practical benchmark for production and sales. The study reported a BEP of 309 fish. This means that sales at or above the reported break-even level are required to cover the costs under the calculation used in the study. Production above the break-even level would generate a positive margin, whereas production below that level would increase the risk of loss.

The SWOT analysis indicates that the enterprise has development potential, particularly because of market demand, the suitability of the cultivation site, and positive financial returns. Nevertheless, the enterprise remains exposed to feed costs, seed availability, weather variability, and operational risks. Development strategies should therefore include improving feed efficiency, strengthening access to quality seed, improving financial record keeping, strengthening cage infrastructure, and expanding market access (Table 4).

Table 4. SWOT Analysis

Factor	**Main findings**
Strengths	RCR > 1; profit of Rp 7,260,000 per cycle; relatively high selling price and stable demand; suitable cultivation site; FNC relatively easy for coastal communities to operate.
Weaknesses	High feed dependence; limited availability of quality seed; relatively high initial cage investment; simple financial record keeping; vulnerability to extreme weather.
Opportunities	Increasing demand for marine food fish; potential expansion of production scale; government support for marine aquaculture; opportunities for interregional and online marketing.
Threats	Fluctuating feed and fish prices; climate and extreme weather; disease and water-quality

	deterioration; competition with capture fisheries; damage to facilities during high waves.

CONCLUSION

Giant trevally (Caranx sp.) cultivation using a floating net cage system in Lautaka Hamlet, Banda Neira, Central Maluku, demonstrated promising technical and economic performance. The main technical indicators were a stocking density of 250 fish, an 83% survival rate, an FCR of 1.2, and an SGR of 0.59% day^{-1}. The reported total production cost was Rp 18,540,000, total revenue was Rp 25,800,000, and profit was Rp 7,260,000 per production cycle. The reported RCR of 1.3 indicates economic feasibility, while the payback period was 2.5 years and the BEP was 309 fish. Overall, the enterprise has potential to be developed as a sustainable source of income for coastal communities, provided that technical and economic management is improved.

RECOMMENDATIONS

Farmers should improve financial record keeping so that production costs, revenue, and profitability can be evaluated more accurately. The quality of seed and feed-use efficiency should also be improved to increase productivity and reduce production costs. Local government support through technical training, production inputs, and access to financing would help strengthen the enterprise. Future studies should examine business risk, including fluctuations in feed prices, fish selling prices, extreme weather, and disease, and should incorporate sensitivity analysis to assess changes in profitability under alternative cost and price scenarios.

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