2026 Volume: 02 Issue: 06 www.ijrpa.com ISSN 2456-9995 Case Study

International Journal Research Publication Analysis

Page: 01-13

FINANCIAL FEASIBILITY OF A SMALL-SCALE BOTTOM GILLNET FISHING UNIT IN BREBES WATERS, CENTRAL JAVA, INDONESIA: A CASE STUDY

Muhammad Adhiyoga Nusantara, Desca Estiyani Dewi*, Sandra Mandika W.

Department of Capture Fisheries Faculty of Fisheries and Marine Science, Universitas Diponegoro Jl. Prof Jacub Rais, Tembalang, Semarang 50275 Indonesia.

Article Received: 3 May 2026
Article Revised: 23 May 2026
Published on: 13 June 2026

***Corresponding Author: Desca Estiyani Dewi**
Department of Capture Fisheries Faculty of Fisheries and Marine Science, Universitas Diponegoro Jl. Prof Jacub Rais, Tembalang, Semarang 50275 Indonesia.

DOI: https://doi-doi.org/101555/ijrpa.9281

ABSTRACT

Small-scale fisheries play an important role in supporting coastal livelihoods and local economic development in Indonesia. However, information regarding the financial performance of small-scale fishing enterprises remains limited, particularly for bottom gillnet fisheries operating in Brebes Waters, Central Java. This study aimed to assess the financial feasibility of a small-scale bottom gillnet fishing unit using a case-study approach.Primary data were collected from a bottom gillnet fishing operation located in Prapag Lor Village, Brebes Regency, Central Java, Indonesia. Financial feasibility was evaluated through investment cost, operational cost, revenue, profit, Revenue-Cost Ratio (R/C Ratio), and Payback Period analyses.The fishing unit required an initial investment of IDR 20,000,000 and incurred annual operating costs of IDR 38,690,500. Annual revenue reached IDR 87,460,000, generating a net profit of IDR 43,669,500. The financial analysis yielded an R/C Ratio of 2.13 and a Payback Period of 0.46 years, indicating that operational revenues substantially exceeded costs and that the initial investment could be recovered within approximately six months.These findings demonstrate that the analyzed bottom gillnet fishing unit was financially feasible and economically viable. The favorable financial performance suggests that small-scale bottom gillnet fisheries have the potential to support household livelihoods and contribute to the economic sustainability of coastal communities.

KEYWORDS: bottom gillnet; financial feasibility; small-scale fisheries; profitability; payback period; Brebes Waters.

1. INTRODUCTION

Small-scale fisheries (SSF) are widely recognized as an essential component of coastal livelihoods and food systems worldwide. Beyond their contribution to fish production, SSF support employment, income generation, food security, and social well-being for millions of people, particularly in developing countries (Allison & Ellis, 2001; Béné, 2006). Recent global assessments have further emphasized the multidimensional importance of SSF, highlighting their contributions not only to nutrition and economic development but also to poverty alleviation, social resilience, and cultural identity in coastal communities (Basurto et al., 2025).

Indonesia possesses one of the largest marine fisheries sectors in the world and is home to a substantial number of small-scale fishers operating across its extensive coastal and archipelagic waters. Small-scale fisheries dominate capture fisheries activities in Indonesia and contribute significantly to employment and local economic development (FAO, 2025). In many coastal regions, fishing activities remain a primary source of household income and play a crucial role in sustaining community livelihoods. However, Indonesian small-scale fisheries face numerous challenges, including fluctuating fish prices, rising operational costs, limited access to financial resources, and environmental uncertainties that may affect fishing productivity and income stability (Stacey et al., 2019; Stacey et al., 2021).

The sustainability of small-scale fisheries is influenced not only by the availability of fishery resources but also by the economic viability of fishing enterprises. Financially viable fishing operations are more likely to maintain fishing activities, replace productive assets, adopt technological improvements, and withstand economic shocks. Consequently, economic viability has become an important component of fisheries sustainability assessments (Schuhbauer& Sumaila, 2016). Hardy et al. (2016) further argued that financially sustainable fishing enterprises tend to demonstrate greater resilience to external disturbances and are better positioned to support long-term livelihood security for fishing households.

Financial feasibility analysis provides an effective approach for evaluating the economic performance of fishing enterprises. Commonly used indicators such as investment costs, operational costs, revenues, profits, Revenue-Cost Ratio (R/C Ratio), and Payback Period enable researchers and stakeholders to assess whether fishing operations generate sufficient returns to justify their investments and operational expenditures. Furthermore, financial assessments contribute to identifying opportunities for improving efficiency and enhancing the economic sustainability of fisheries enterprises (Schuhbauer et al., 2017; Onyango et al.,

2021). Studies on capture fisheries profitability have also demonstrated that understanding financial performance is essential for supporting fisheries development and improving fisher welfare (Siaila&Rumerung, 2022).

Among the fishing gears commonly operated by Indonesian small-scale fishers, bottom gillnets represent one of the most widely utilized passive fishing gears. Bottom gillnets are generally characterized by relatively low investment requirements, simple operational procedures, and the ability to target commercially valuable demersal fish species. These characteristics make bottom gillnets particularly suitable for small-scale fishing enterprises that rely on limited capital and family-based labor systems. Similar patterns have been observed in artisanal fisheries worldwide, where simple fishing technologies continue to play a critical role in supporting local livelihoods and economic activities (Kittinger et al., 2012; Rousseau et al., 2019).

Brebes Regency, located on the northern coast of Central Java, is one of the coastal areas where fisheries constitute an important economic activity for local communities. Small-scale fishers in the region operate a variety of fishing gears, including bottom gillnets, to exploit coastal fishery resources. As in many coastal regions of Indonesia, fishing activities in Brebes Waters provide important livelihood opportunities and contribute to local economic development (FAO, 2025; Stacey et al., 2021). Despite the importance of bottom gillnet fisheries in supporting fishing households, information regarding their financial performance remains limited. Most fisheries-related studies have traditionally focused on biological, ecological, and technological aspects, while fewer studies have specifically examined the economic viability of fishing enterprises at the operational level.

Understanding the financial feasibility of bottom gillnet fisheries is particularly important because economic sustainability directly influences the capacity of fishers to maintain fishing operations and improve household welfare. Financially feasible fishing enterprises are generally better equipped to cope with economic uncertainties and sustain long-term operations (Schuhbauer& Sumaila, 2016; Onyango et al., 2021). However, specific information regarding the financial feasibility of small-scale bottom gillnet fisheries operating in Brebes Waters remains scarce.

Therefore, this study aimed to assess the financial feasibility of a small-scale bottom gillnet fishing unit operating in Brebes Waters, Central Java, Indonesia. Using a case-study approach, the research evaluated investment costs, operational costs, revenues, profits, Revenue-Cost Ratio, and Payback Period to determine the economic viability of the fishing

operation. The findings are expected to contribute to the growing literature on small-scale fisheries economics and provide useful information for fisheries development initiatives aimed at improving the livelihoods of coastal fishing communities.

2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted in Prapag Lor Village, Brebes Regency, Central Java, Indonesia, from January to March 2025. Brebes Waters are located along the northern coast of Java and constitute an important fishing ground for small-scale fisheries operating in the Java Sea. The area supports various fishing activities utilizing passive and active fishing gears, including bottom gillnets, trammel nets, and crab fisheries. Small-scale fishing operations in the area are generally conducted using vessels smaller than 5 GT and are characterized by limited fishing ranges and relatively low capital investment.

2.2 Research Design and Data Collection

A case study approach was employed to evaluate the financial feasibility of a small-scale bottom gillnet fishing operation. The study focused on a representative fishing unit, namely the vessel *Sri Putri Kembar*, operated by a local fisher in Prapag Lor Village. The case study approach was selected to obtain detailed operational and financial information from an active fishing enterprise.

Primary data were collected through direct observation, structured interviews, and documentation during field activities. Interviews were conducted with the vessel owner to obtain information regarding investment costs, operational expenditures, maintenance costs, fishing activities, revenues, and annual fishing performance. Operational observations were also conducted during fishing trips to verify fishing practices and support data validation.

Secondary data were obtained from the Fisheries Service of Brebes Regency and relevant scientific literature. Secondary information included fisheries production statistics, fishing fleet characteristics, and the distribution of fishing gears operating in the study area.

2.3. Data Analysis

Financial data obtained from the case-study fishing unit were analyzed descriptively to evaluate investment costs, operational expenditures, revenues, profitability, and business feasibility indicators. Data were obtained through structured interviews with skippers, crew members, and vessel owners, ensuring the reliability of the information collected.

2.3.1. Financial Analysis

The financial feasibility of the bottom gillnet fishing operation was evaluated using investment cost, fixed cost, variable cost, total cost, annual revenue, annual profit, Revenue-Cost Ratio (R/C Ratio), and Payback Period (PP). Financial data were analyzed on an annual basis.

Investment Cost

Investment cost refers to the initial capital required to establish the fishing operation. The investment components included the fishing vessel, engine, and bottom gillnet unit. Total investment was calculated as:

$$IC = \sum_{i=1}^{n} Ii$$

Description:

IC = total investment cost (IDR)

Ii= individual investment component (IDR)

n = total investment components

Depreciation Expense

Depreciation refers to the systematic allocation of investment costs over the economic lifespan of an asset. Primyastanto (2022),was calculated depreciation using the straight-line method. This approach aligns with PSAK 16 on fixed assets (IAI, 2011; revised 2014, effective 2024), and depreciation is calculated using the following formula:

$$Depreciation = \frac{Investment\ value}{N}$$

Description :

N =Economic Life (years)

Fixed Cost

Fixed costs consisted of annual depreciation and maintenance expenses associated with fishing assets. Fixed cost was calculated as:

$$FC = DC + MC$$

Description:

FC= fixed cost (IDR)

DC= depreciation cost (IDR)

MC= maintenance cost (IDR)

Variable Cost

Variable costs represented operational expenditures incurred during fishing activities, including fuel, lubricants, food, beverages, and other consumable supplies. Variable cost was calculated as:

$$VC = OC \; x \; T$$

Description:

VC = annual variable cost (IDR)

OC = operational cost per fishing trip (IDR)

T = number of fishing trips

Total Cost

Total annual cost was obtained by summing fixed and variable costs:

$$TC = FC + VC$$

Description:

TC = total cost (IDR)

FC = fixed cost (IDR)

VC = variable cost (IDR)

Revenue

Revenue is derived from the sale of fish catches, calculated by multiplying the total production volume by the selling price per unit. According to (Primyastanto, 2022; IAI, 2011), the formula is expressed as:

$$TR = \sum Q \; x \; Pi$$

Description:

TR = total revenue (IDR)

Q = quantity of catch sold (kg)

P = price of catch (IDR/kg)

Profit

Annual profit was determined as the difference between total revenue and total cost:

$$\pi = TR - TC$$

Description:

π = Profit (IDR)

TR = Total revenue (IDR)

TC = Total cost (IDR)

Revenue-Cost Ratio (R/C Ratio)

The Revenue-Cost (R/C) ratio is employed to evaluate the income and financial efficiency of fisheries enterprises over a one-year period. This ratio provides an indication of whether the revenues generated are sufficient to cover the costs incurred in fishing operations. According to (Primyastanto, 2022;Salim, 2001),the R/C ratio is formulated as:

$$R/C\ Ratio = \frac{TR}{TC}$$

Description:

TR =Total Revenue (Rp/Year)

TC =Total Cost (Rp/Year)

Interpetation:

If R/C > 1: the business considered profitable and financially feasible.

If R/C<1: the business is deemed unprofitable and economically unsustainable

If R/C = 1: the business is at the break-even point

Payback Period (PP)

The Payback Period (PP) analysis is used to determine the length of time required to recover the initial investment capital in a business. According to (Primyastanto, 2022; Salim, 2001), the Payback Period is calculated as:

$$PP = \frac{I}{\pi} \times 1\ years$$

Description :

PP= Payback Period (years)

I= Initial Investment (Rp)

ΠΠ=Annual net Profit (Rp/year)

Criteria:

PP< 3 years :Fast Return on Investment

PP 3–5 years :Moderate Return on Investment

PP > 5 years :Slow Return on Investment

3. RESULTS AND DISCUSSION

3.1 Characteristics of the Study Fishing Unit

The fishing unit analyzed in this study was a small-scale bottom gillnet operation locally known as *Sri Putri Kembar*, operating in Prapag Lor Village, Brebes Regency, Central Java. The fishing unit was operated using a wooden vessel equipped with a 10 HP diesel engine

and a bottom gillnet targeting demersal fish resources in coastal waters. The vessel measured 5.21 m in length, 1.88 m in width, and 1.52 m in depth, representing a typical small-scale fishing operation commonly found in northern Java.

Fishing activities were conducted using a one-day fishing system, with fishing grounds located approximately 1.6–1.8 nautical miles from the landing site. Such operational characteristics are consistent with the general profile of small-scale fisheries, which typically rely on limited capital investment, simple fishing technologies, and relatively short fishing trips (Kittinger et al., 2012; Rousseau et al., 2019). Although operating at a relatively small scale, these fisheries play an important role in supporting household livelihoods and local economies, particularly in coastal communities where alternative employment opportunities may be limited (Basurto et al., 2025).

Table 1. Characteristics of the bottom gillnet fishing unit analyzed in this study.

Variable	Description
Fishing unit	Sri Putri Kembar
Fishery type	Small-scale capture fishery
Fishing gear	Bottom gillnet
Vessel material	Wood
Vessel length (m)	5.21
Vessel width (m)	1.88
Vessel depth (m)	1.52
Engine type	Diesel engine
Engine power (HP)	10
Fishing trip system	One-day fishing
Fishing ground distance (nm)	1.6–1.8
Target resources	Demersal fish

3.2 Financial Analysis

Investment and Cost Structure

The analyzed fishing unit required an initial investment of IDR 20,000,000, consisting of a fishing vessel, diesel engine, and bottom gillnet fishing gear. The fishing vessel represented the largest proportion of investment expenditure, followed by the engine and fishing gear. This investment structure reflects the relatively low capital requirements that characterize many small-scale fishing enterprises. Low investment barriers are often considered an important factor supporting the participation of coastal households in fisheries activities, particularly in developing countries where access to financial resources may be limited (Schuhbauer& Sumaila, 2016; Hardy et al., 2016).

The annual operational expenditure of the fishing unit reached IDR 38,690,500, consisting of fixed costs and variable costs. Fixed costs amounted to IDR 6,762,500, whereas variable costs reached IDR 31,928,000, accounting for approximately 82.5% of total annual expenditure. The dominance of variable costs indicates that the economic performance of the fishing enterprise is highly dependent on operational efficiency and fishing activities. Similar cost structures have been reported in many small-scale capture fisheries, where operational expenses constitute the largest component of total fishing costs (Siaila&Rumerung, 2022).

Among all expenditure categories, fuel represented the largest operational cost component. This finding is consistent with previous studies indicating that fuel expenditure is one of the most important determinants of fishing profitability and economic performance in small-scale fisheries (Onyango et al., 2021; Stacey et al., 2021). Rising fuel prices may significantly reduce profit margins and increase the economic vulnerability of fishing households, particularly those operating with limited financial capacity.

The relatively low proportion of fixed costs suggests that depreciation and maintenance expenses remain manageable compared to operational expenditures. Consequently, improvements in operational efficiency, especially those related to fuel consumption and fishing productivity, may provide greater opportunities for increasing profitability than reductions in capital-related expenses.

Revenue, Profitability and Economic Implications

The bottom gillnet fishing operation generated an annual revenue of IDR 87,460,000. After deducting total annual costs, the fishing unit produced a net profit of IDR 43,669,500. These findings indicate that the fishing enterprise generated positive financial returns and maintained a favorable balance between income and expenditure.

Profitability is widely recognized as one of the primary indicators of economic sustainability in small-scale fisheries because it reflects the ability of fishing enterprises to maintain operations, replace productive assets, and support household livelihoods (Schuhbauer& Sumaila, 2016). The positive profit generated by the analyzed fishing unit suggests that bottom gillnet fishing remains an economically attractive activity in the study area.

The profitability observed in this study is consistent with findings reported by Siaila and Rumerung (2022), who found that capture fisheries enterprises can generate substantial economic benefits when revenues consistently exceed operational expenditures. Similarly, Onyango et al. (2021) emphasized that the economic contribution of small-scale fisheries is

often underestimated despite their important role in supporting livelihoods and local economic activities.

From a household perspective, positive profitability may improve economic resilience by enabling fishers to meet operational needs, support household expenditures, and reinvest in productive fishing assets. Consequently, profitable fishing enterprises contribute not only to individual household welfare but also to broader coastal economic development.

The financial feasibility analysis yielded an R/C Ratio of 2.13, indicating that every IDR 1.00 spent on fishing operations generated IDR 2.13 in revenue. This result demonstrates that revenues substantially exceeded operational costs and confirms the economic viability of the fishing enterprise. Financial indicators such as profitability and cost-revenue relationships are widely used in fisheries economics because they provide practical measures of business performance and long-term sustainability (Schuhbauer et al., 2017; Onyango et al., 2021).

The Payback Period was estimated at 0.46 years, equivalent to approximately 5.5 months. This result indicates that the initial investment could be recovered within less than one year of operation. A short capital recovery period generally reflects low investment risk and increases the attractiveness of fisheries enterprises for fishers and potential investors. Similar observations have been reported in economically viable small-scale fisheries where favorable profitability indicators contribute to business resilience and long-term sustainability (Hardy et al., 2016; Siaila&Rumerung, 2022).

The favorable financial performance observed in this study has important implications for fisheries development. According to the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries, economic viability is a key component of sustainable fisheries development because financially secure fishing households are generally better positioned to improve livelihoods, maintain productive assets, and adapt to changing environmental and economic conditions (FAO, 2015). Furthermore, recent global assessments have highlighted the importance of economically viable small-scale fisheries in supporting food security, employment, and social well-being in coastal communities (FAO, 2024; Basurto et al., 2025).

The combination of a high R/C Ratio and a short Payback Period indicates that the analyzed fishing unit possesses strong economic potential and contributes positively to household livelihood security. Nevertheless, the findings should be interpreted within the limitations of a case-study approach. Since the analysis was conducted using a single fishing unit, the results cannot be generalized to all bottom gillnet fisheries operating in Brebes Waters. Future studies involving a larger number of fishing units are therefore recommended to

provide a more comprehensive understanding of the economic performance and financial sustainability of bottom gillnet fisheries in the region.

Table 2. Investment, Cost Structure, and Financial Feasibility Indicators of the Bottom Gillnet Fishing Unit in Brebes Waters.

Item	Average (Rp)
Investment (Rp)	
a. Boat	10,500,000
b. Fishing Gear	2,500,000
c. Engine	7,000,000
Fixed Costs (Rp/Year)	
a. Depreciation	3,962,500
b. Maintenance	2,800,000
Variable Cost (Rp/Year)	
a. Supplies	31,928,000
Total Cost (Rp/Year)	38,690,500
Revenue (Rp/Year)	87,460,000
Profit (Rp/Year)	43,669,500
R/C *ratio*	2.13
Payback period	0.46

4. CONCLUSION

This study demonstrated that the analyzed small-scale bottom gillnet fishing unit operating in Brebes Waters, Central Java, Indonesia, was financially feasible and economically viable. The fishing enterprise generated positive financial returns, as indicated by an R/C Ratio of 2.13 and a Payback Period of 0.46 years. These findings suggest that operational revenues substantially exceeded annual costs and that the initial investment could be recovered within approximately six months of operation.

The favorable financial performance observed in this study indicates that small-scale bottom gillnet fisheries have the potential to provide sustainable economic benefits and support household livelihoods in coastal communities. Financially viable fishing enterprises may contribute to livelihood security by enabling fishers to maintain fishing operations, reinvest in productive assets, and cope with economic uncertainties. However, because the analysis was based on a single fishing unit, the findings should be interpreted as a case study and should not be generalized to all bottom gillnet fisheries operating in Brebes Waters. Future studies involving a larger number of fishing units are recommended to provide a more comprehensive assessment of the financial performance and economic sustainability of bottom gillnet fisheries in the region.

REFERENCES

1. Allison, E. H., & Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. Marine Policy, 25(5): 377–388. https://doi.org/10.1016/S0308-597X(01)00023-9
2. Basurto, X., Gutierrez, N. L., Franz, N., Smith, H., Salas, S., Chuenpagdee, R., et al. (2025). Illuminating the multidimensional contributions of small-scale fisheries. Nature, 637: 875–884. https://doi.org/10.1038/s41586-024-08448-z
3. Béné, C. (2006). Small-scale fisheries: Assessing their contribution to rural livelihoods in developing countries. FAO Fisheries Circular No. 1008. Rome: Food and Agriculture Organization of the United Nations.
4. FAO. (2015). Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. Rome: Food and Agriculture Organization of the United Nations.
5. FAO. (2024). The State of World Fisheries and Aquaculture 2024. Rome: Food and Agriculture Organization of the United Nations.
6. FAO. (2025). Small-Scale Fisheries in Indonesia. Rome: Food and Agriculture Organization of the United Nations.
7. Hardy, P. Y., Béné, C., Doyen, L., & Mills, D. J. (2016). Viability and resilience of small-scale fisheries through cooperative arrangements. Environment and Development Economics, 21(4): 489–509. https://doi.org/10.1017/S1355770X15000239
8. Kittinger, J. N., Finkbeiner, E. M., Glazier, E. W., & Crowder, L. B. (2012). Human dimensions of small-scale and traditional fisheries in the Asia-Pacific region. Pacific Science, 66(2): 195–214. https://doi.org/10.2984/66.2.2
9. Onyango, H. O., Ochiewo, J., Aura, C. M., Kayanda, R., Sunil, S. S., Otuo, P. W., Obuya, J. A., & Njiru, J. M. (2021). The Lost Coin: Redefining the economic and financial value of small-scale fisheries, the case of Lake Victoria, Kenya. Social Sciences & Humanities Open, 4(1): 100221. https://doi.org/10.1016/j.ssaho.2021.100221
10. Primyastanto, I. M. 2022. ManajemenOperasi Usaha Perikanan. Malang. Media Nusa Creative.
11. Rousseau, Y., Watson, R. A., Blanchard, J. L., & Fulton, E. A. (2019). Defining global artisanal fisheries. Marine Policy, 108: 103634. https://doi.org/10.1016/j.marpol.2019.103634

12. Salim, S. S., & Biradar, R. S. (2001). Fisheries Economics and Marketing: Practical Manual. Mumbai: Central Institute of Fisheries Education.
13. Schuhbauer, A., & Sumaila, U. R. (2016). Economic viability and small-scale fisheries—A review. Ecological Economics, 124: 69–75. https://doi.org/10.1016/j.ecolecon.2016.01.018
14. Schuhbauer, A., Chuenpagdee, R., Cheung, W. W. L., Greer, K., & Sumaila, U. R. (2017). How subsidies affect the economic viability of small-scale fisheries. Marine Policy, 82: 114–121. https://doi.org/10.1016/j.marpol.2017.05.013
15. Siaila, S., &Rumerung, D. (2022). Analysis of the profitability of small pelagic capture fisheries in Ambon City, Indonesia. AACL Bioflux, 15(2): 608–620.
16. Stacey, N., Gibson, E., Loneragan, N. R., Warren, C., Wiryawan, B., Adhuri, D., Steenbergen, D., & Fitriana, R. (2019). Enhancing coastal livelihoods in Indonesia: An evaluation of recent initiatives on gender, women and sustainable livelihoods in small-scale fisheries. Maritime Studies, 18: 359–371. https://doi.org/10.1007/s40152-019-00142-5
17. Stacey, N., Steenbergen, D. J., Clifton, J., Acciaioli, G., Fabinyi, M., & Trimble, M. (2021). Developing sustainable small-scale fisheries livelihoods in Indonesia: Trends, enabling and constraining factors, and future opportunities. Ocean and Coastal Management, 209: 105689. https://doi.org/10.1016/j.ocecoaman.2021.105689