Geojournal of Tourism and Geosites
ISSN 2065-0817, E-ISSN 2065-1198

Year IX, vol. 64, no. 1, 2026, p.238-249
DOI 10.30892/gtg.64121-1672

# EVALUATION OF FISH RESOURCE STATUS AS RAW MATERIALS FOR SMOKED FISH IN PROMOTING COASTAL TOURISM IN PRIGI BAY, TRENGGALEK, INDONESIA

**Pudji PURWANTI [1*], Dwi SOFIATI [2], Candra Adi INTYAS [1], Mochammad FATTAH [1], Asyifa ANANDYA [2], Vika Annisa QURRATA [3], Katon Ageng PAMUNGKAS [2], Bagas FIRMANSYAH [1]**

[1] Universitas Brawijaya, Faculty of Fisheries and Marine Science, Malang, East Java, Indonesia; pudjipurwanti@ub.ac.id (P.P); candra.intyas@ub.ac.id (C.A.I.); mochammadfattah@ub.ac.id (M.F.); bagassfirr@student.ub.ac.id (B.F.)
[2] Universitas Brawijaya, PSDKU Socio-Economics of Fisheries, Malang, East Java, Indonesia; dwisofiati@ub.ac.id (D.S.); asyifaanandya@ub.ac.id (A.A.); katon.pamungkas@student.ub.ac.id (K.A.P.)
[3] Universitas Negeri Malang, Faculty of Economics and Management, Malang, East Java, Indonesia; vika.annisa.fe@um.ac.id (V.A.Q.)

**Citation:** Purwanti, P., Sofiati, D., Intyas, C.A., Fattah, M., Anandya, A., Qurrata, V.A., Pamungkas, K.A., & Firmansyah, B. (2026). Evaluation of fish resource status as raw materials for smoked fish in promoting coastal tourism in Prigi bay, Trenggalek, Indonesia. *Geojournal of Tourism and Geosites*, 64(1), 238–249. https://doi.org/10.30892/gtg.64121-1672

**Abstract:** Prigi Bay presents a variety of appealing tourism attractions, including pristine sandy beaches, mangrove ecosystems, and turtle conservation efforts, hence providing a substantial chance to draw both domestic and foreign visitors. Tourists typically do not depart without acquiring distinctive gifts. A unique gift from this region is smoked fish, made by traditional methods, yielding a distinctive and delectable flavor. Nonetheless, the substantial demand for smoked fish must be reconciled with the appeal of the fish supplies within its waterways. This study aimed to evaluate the profitability and financial viability of the smoked fish processing industry, as well as to assess the availability of fish resources as raw materials for this process in Prigi Bay, Trenggalek. Prigi Bay is a region with high fish production and attractive coastal tourism, offering opportunities to develop local souvenirs, such as smoked fish. The profitability of the fish processing enterprise yields R/C, BEP, profit, and profitability that align with established profitability criteria. The viability of the smoked fish processing enterprise yields a favorable NPV, a Net Benefit-Cost ratio over 1, an IRR surpassing the 12% interest rate, and an expedited Payback Period. The investigation of the exploitation status indicated that five of the six primary commodities— blue mackerel, skipjack, squid, tuna, and rainbow runner— are undergoing biological overfishing, with tuna and blue mackerel facing the most pressure. The majority of species are in a state of full or moderate exploitation, whereas yellowfin tuna is nearing full exploitation but has not yet reached overfished status. A marketing strategy centered on high-value commodities, collaborative stakeholder engagement, and stringent fisheries management laws, including catch quotas and seasonal fishing limitations, to guarantee ecological and economic sustainability. These findings confirm the financial viability of a fish smoking enterprise in Prigi Bay by employing a fish stock-based adaptive quota model, which adjusts raw material allocation according to exploitation status, prioritizing fish resources that remain unsustainably harvested.

**Keywords:** coastal tourism, overfishing, profitability, smoked fish, sustainability fishery

* * * * * *

## INTRODUCTION

Tourism is a crucial sector in regional development and contributes significantly to regional income. Tourism has developed into a sector that yields advantageous impacts for several stakeholders, including the government, society, and the business sector (Yudha et al., 2020). The government can implement measures to assist investors in constructing infrastructure, thereby fostering the advancement of domestic tourism, which is essential for the overall progression of the tourism sector. A region that formulates an effective tourism development plan can alter the dynamics of power within the global tourism sector (Safarov et al., 2022). The coastal tourism sector can generate new economic prospects for local communities, including enhanced employment possibilities, increased revenue, and investment in tourism (Raihan & Oktavianus, 2023; Woo et al., 2016). Tourism, being a highly dynamic sector, has complex and sometimes unpredictable effects on the environment, both locally and worldwide (Herman, Deac, et al., 2024).

The opinions and motives of prospective tourists at attractions are essential factors that influence the sustainable growth of tourism destinations (Herman, Tătar, et al., 2024). Tourism can expand swiftly by using local products, thereby enhancing the visitor experience and bolstering the local economy. The incorporation of local items into tourism fosters genuine experiences (Chantakit et al., 2022). Culinary tourism, emphasizing local cuisine experiences, has arisen as a significant part of tourism that positively impacts rural development by enhancing the community's social and economic structure (Testa et al., 2019; Vázquez-Martínez et al., 2019). The promotion of traditional agrifood items, which frequently embody local cultural practices and identities, serves as a catalyst for attracting and retaining tourists (Cafiero et al., 2019; Zhang et al., 2019). Processed souvenir products significantly enhance the visitor attractiveness of a region.

* Corresponding author

Local products serve not just as commercial commodities but also as representations of the cultural and culinary identity of a tourism area. The presence of traditionally processed local items provides a genuine gastronomic experience and serves as a draw for travelers seeking to explore the richness of coastal culture.

Culinary tourism significantly contributes to a nation's economy. It has been demonstrated to enhance the competitive dynamics and long-term viability of a destination, along with benefiting the local economy and regional development (Sutiadiningsih et al., 2024). Cultural traditions are at risk of becoming invisible due to globalization and the standardization of digital content, with traditional food emerging as a symbolic battleground for discourse. The extensive culinary diversity linked to regional, ethnic, and popular identities, facilitated by digitalization, offers both opportunities and problems for the preservation and development of this intangible heritage. Conventional cuisines frequently lack the resources, expertise, or methodologies to establish cultural traditions within a digital landscape governed by commercial imperatives and global aesthetics. Gastronomy is regarded not merely as an economic service but also as a symbolic representation of collective memory and identity (Cordova-Buiza et al., 2025).

Gastronomy provides unique experiences for tourists, presenting them with unparalleled gastronomic opportunities. Moreover, tourists can engage with a region's history and traditions or partake in the culinary preparation process, so enhancing the variety of tourism activities and augmenting tourist interest (Adirestuty et al., 2025). A competitive strategy for the advancement of culinary tourism in particular regions is essential to confront the substantial progress in gastronomic heritage (Rivza et al., 2022). Advancements in packaging and presentation, including sustainable packaging and inventive flavor variations, can enhance the product's market value. Moreover, travelers' participation in the production process, such as observing the smoking of fish firsthand or attempting to process it themselves, can constitute an interactive and educational tourist attraction. The collaboration between processed local products and tourism enhances regional economic revenue and strengthens the branding and sustainable attractiveness of a destination.

Marine tourism represents a primary industry in Indonesia, particularly in East Java Province. Many assert that tourist growth can yield multiplier impacts on communities across social, economic, cultural, industrial, and technological dimensions (Kurniawati et al., 2022). Prigi Bay is an area located in East Java that features coastal tourist destinations, including Prigi Beach, Karanggongso Beach, Mutiara Beach, floating houses, and the Cengkrong mangrove forest, all situated near the Prigi Nusantara Fisheries Port. Local residents exploit the abundant fish harvest to manufacture premium items, namely smoked fish, to attract tourists. The processing of smoked fish enhances the local economy and elevates regional culinary specialties, hence augmenting the attractiveness of culinary tourism. The sustainability of fish resources ensures a consistent supply of raw materials, fostering innovation in businesses and micro-enterprises involved in fish processing. The utilization of fish as a raw material for smoking not only enhances the income of local residents but also fortifies the identity of Prigi Bay as a distinctive and sustainable tourism attraction.

The management of fishing resources is essential for sustaining fish populations (Purwanti et al., 2024a). Understanding of fish resource availability is essential for the viability of smoked fish processing enterprises. Variations in the availability of fish raw materials immediately influence production continuity, price stability, and business profitability. Excessive exploitation without adequate resource management might jeopardize the sustainability of fish stocks and disrupt the supply chain of processing enterprises. Consequently, the adoption of sustainable fishing practices, including the establishment of harvest quotas informed by fish stock data, the enforcement of closed seasons, and the diversification of raw materials, constitutes vital methods for ensuring long-term availability. The Schaefer model determines the fishing effort level that yields Maximum Sustainable Yield (MSY), enabling fisheries managers to establish quotas or impose restrictions on fishing gear to avert overfishing. Schaefer's methodology in fisheries management is crucial for preserving ecological equilibrium and serves as a benchmark for developing policies that guarantee the sustained availability of fish stocks as raw materials for smoked fish processing over the long term. This study aims to: (1) evaluate the profitability and financial viability of smoked fish processing enterprises in Prigi Bay, Trenggalek; and (2) examine the availability and sustainability of fish resources as the primary raw material.

## MATERIALS AND METHODS

### Study area

This study was conducted in the Prigi Bay, Trenggalek Regrency, East Java Province, Indonesia (Figure 1). The selection of blue mackerel, skipjack tuna, squid, mackerel, yellowfin tuna, and rainbow runner as research subjects was determined by the existing market demand for smoked fish in Prigi Bay. This consumer desire generates differing exploitation pressures on each species, making an assessment of fish resource status essential for evaluating the availability of raw materials for smoked fish. This study utilizes a quantitative descriptive methodology to assess and elucidate the financial viability of a fish smoking enterprise and the condition of fish consumption of resources through numerical data analysis. The data are categorized into two types: (1) primary data obtained via interviews with 35 business owners through purposive sampling and participant observation; and (2) secondary data comprising production and fishing effort reports from 2014 to 2023 sourced from the Prigi Nusantara Fisheries Port, Trenggalek Regency.

### Data analysis

The data analysis employed in this study includes profitability analysis, specifically utilizing R/C, BEP, profit, and profitability metrics. Financial feasibility assessment utilizing NPV, B/C ratio, IRR, and PBP methodologies. Utilization of Scheafer's biological technique for the analysis of sustainable potential serves to: forecast the sustainable capacity of fish resources, ascertain the appropriate fishing effort, and evaluate the risk of overfishing.

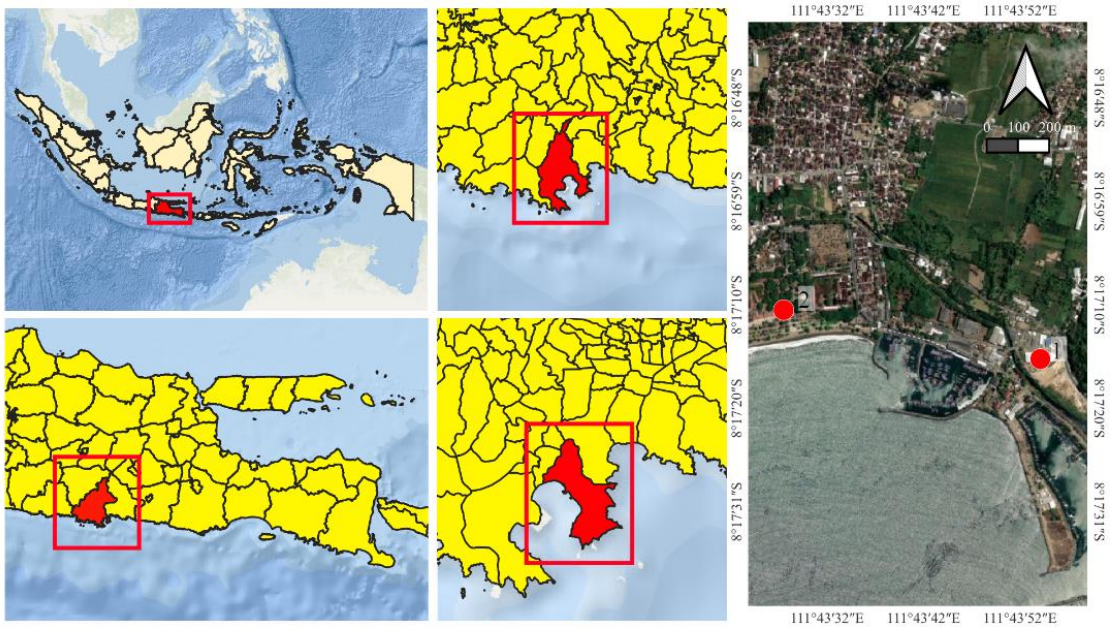



Figure 1. The study area map (1): 8° 17' 15.25" LS, 111° 43' 54.47" BT and
(2): 8° 17' 10.14" LS, 111° 43' 27.62" BT) Prigi Bay, Trenggalek Regency, Indonesia (Source: author, 2025)

**Profitability of Fish Smoking Business**

Phases of profitability data analysis (Fattah et al., 2023a), which includes:

1. Collecting fixed capital data
2. Collecting data on production and pricing numbers
3. Collecting data on fixed and variable costs
4. Analyzing R/C, Break-Even Point, Revenue, Profitability, and Profitability Ratio

Revenue (TR) is the business's value derived from the product of price and production quantity in rupiah, as represented by the following formula (Intyas et al., 2019):

$$TR = P \times Q$$

Where: TR = Total Revenue (IDR); P = Price (IDR); Q = Production Quantity (unit)

Total cost (TC) is the sum of fixed costs (FC) and variable costs (VC) expressed in rupiah, with the following formula (Intyas et al., 2019):

$$TC = FC + VC$$

Where: TC = Total Cost (IDR); FC = Fixed Cost (IDR); VC = Variable Cost (IDR)

R/C represents the ratio of revenue to the total cost of the business. Criteria: if R/C > 1, the business is deemed profitable; if R/C < 1, the business is classified as incurring a loss; and if R/C = 1, the business is considered to be at break-even. The R/C formula (Intyas et al., 2019), is stated as follows:

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

The Break Even Point (BEP) is a business state characterized by neither profit nor loss, determined by a formula based on sales. The formulas for BEPs and BEPq (Primyastanto et al., 2021), are as follows:

$$BEP_s = \frac{FC}{1 - \frac{VC}{TR}}$$

Where: $BEP_s$ = Break-even point determined by sales (IDR)

Criteria: if BEPs < TR then the business is declared profitable. The Break-Even Point in quantity (BEPq) calculation is based on units sold across diverse products (Primyastanto et al., 2021), as follows:

$$BEP_{qn} = \frac{\frac{TR_n}{TR_t} \times BEP_s}{P_n}$$

Where: $BEP_{qn}$ = BEP for the nth product; $TR_n$ = Revenue earned by the nth product;
$TR_t$ = Total Revenue; $P_n$ = Price of the nth product

Profit is the difference between total revenue and total costs in rupiah units using the formula (Primyastanto et al., 2021), as follows;

$$\pi = TR - TC$$

Where: $\pi$ = Profit (IDR);

Criteria: If the income produces a value above 0 and is positive, the business is considered profitable.

Profitability refers to the capacity of capital to yield a business profit expressed in percentage terms. The profitability

criterion dictates that any business investing capital at a specific value will yield a profit equal to the capital multiplied by the profitability rate. The formula for profitability is (Primyastanto et al., 2021), as follows:

$$Profitability = \frac{\pi}{M} \times 100\% \text{ ; Where: M = Capital used (IDR)}$$

**Financial Feasibility of Fish Smoking Business**

Stages of financial feasibility data analysis, including:

1. Collecting data on fixed capital
2. Collecting data on production and price
3. Collecting data on fixed and variable costs
4. Analyxing NPV, B/C, IRR and PBP

Net Present Value (NPV) is a common investment indicator utilized to assess the profitability of a project or organization by evaluating the difference between the present-valued benefits (receipts) and costs (expenses). A project is considered practicable if the Net Present Value (NPV) derived from a business above zero (NPV > 0). If the Net Present Value (NPV) of the project is zero (NPV = 0), it indicates that the project has reached the Break-Even Point (BEP). If the project's NPV is less than zero (NPV < 0), it is considered infeasible for execution or development. The Net Present Value (NPV) can be calculated using the formula (Anandya et al., 2023a), as illustrated below:

$$\text{NPV} = \sum_{t=n}^{i=0} \frac{Bt-Ct}{(1+i)^t} - I$$

Where: Bt = benefit in year t; Ct = costs in year t; n = economic lifespan of a project; I = current interest rate; l = initial capital

The Internal Rate of Return is an analysis used to determine the interest rate that equalizes the present value of an investment with the present value of future net cash inflows. The evaluation criteria for IRR are as follows: If the IRR exceeds the applicable interest rate (necessary profit rate), the business is profitable; conversely, if the IRR is less than the relevant interest rate, the business incurs losses. The formula for calculating the Internal Rate of Return (IRR) is (Anandya et al., 2023a), as follows:

$$\text{IRR} = \text{PI} - \text{CI}\,\frac{P2-P1}{C2-C1}$$

Where: $P_1$ = 1st interest rate; $P_2$ = 2nd interest rate; $C_1$ = 1st NPV ; $C_2$ = 2nd NPV

The Net Benefit Cost Ratio compares the value of positive NPV to that of negative NPV. This indicator assesses the benefits derived from the company's efforts relative to the costs invested for such efforts. The B/C assessment criteria stipulate that if the Net BC value exceeds 1, the project is deemed lucrative; conversely, if the Net BC value is less than 1, the project is considered unprofitable. Net BC is calculated using the formula (Anandya et al., 2023b), as detailed below:

$$\text{Net BC} = \frac{\sum NPV\,(+)}{\sum NPV\,(-)}$$

The Payback Period is an indicator that assesses how fast at which an investment returns its costs. The unit of this value is a periodic unit (month, year, etc.). The formula for calculating the Payback Period (PBP) (Anandya et al., 2023b), is as follows:

$$\text{PBP} = \frac{investasi}{kasbersih/tahun} X \text{ 1 tahun}$$

**Status of Fish Resources as Raw Material for Smoked Fish**

The assessment used in quantifying fisheries bioeconomics is the Gordon-Schaefer model. The calculation of CPUE (Catch Per Unit Effort) involves dividing the entire catch by the fishing effort to ascertain fish abundance and usage levels. In 1983, Gulland articulated the following:

$$CPUE = \frac{C}{E}$$

Where: CPUE = Catch Per Unit Effort; C = Catch (Unit Weight/Kg/ Ton); E = Fishing Effort (Number of Trips/Fleet/Fishing Gear); Several fishing gears can typically be used to capture a single species of fish, requiring the standardization of fishing equipment. The phases of fishing gear standardization (Purwanti et al., 2024b) are as follows:

1. Calculate the CPUE for each fishing gear in producing a certain fish species.
2. Select the highest average CPUE ($CPUE_S$) as the standard fishing gear for the Bioeconomic calculation. The formula for the Fishing Power Index is as follows:

$$FPI_i = \frac{CPUE_i}{CPUE_s}$$

Where: $FPI_i$ = Fishing Power Index of each fishing gear; $CPUE_i$ = Average CPUE to be standardized;
$CPUE_S$ =Average CPUE to be standard

3. Next, calculate the standar effort (Es) = $FPI_i$ x $E_i$ (number of trips/fishing gear/fleet of each type of standardized fishing gear). The standardized CPUE (Y) and Effort (Es) values can be used as estimates of Scheafer's model stock (Purwanti et al., 2024b), with the equation:

$$Y = a - b.X; CPUE = a - b.E$$

Catch (C) can be formulated (Indrayani & Fattah, 2021), as follows: $C = aE - b.E^2$

The sustainable fishing effort ($E_{MSY}$) is obtained from the derivative of the equation C above = 0 (Indrayani & Fattah, 2021), namely:

$$C = aE - b.E^2 \text{ ; } C' = a - 2b.E = 0 \text{ ; } a = 2b.E \text{ ; } E_{MSY} = \frac{a}{2b}$$

The sustainable catch ($C_{MSY}$) is obtained by substituting the $E_{MSY}$ value into equation C (Purwanti et al., 2024b), thus obtaining the following formula:

$$C = aE - b.E^2 \; ; C_{MSY} = a\left(\frac{a}{2b}\right) - b.\left(\frac{a}{2b}\right)^2 \; ; C_{MSY} = \left(\frac{a^2}{2b}\right) - \left(\frac{a^2b}{4b^2}\right) \; ; C_{MSY} = \left(\frac{2a^2b}{4b^2}\right) - \left(\frac{a^2b}{4b^2}\right) \; ; C_{MSY} = \frac{a^2}{4b}$$

The utilization level (UL) of fish resources can be calculated using the formula (Purwanti et al., 2024b), as follows:

$$UL = \frac{C_{riil}}{C_{MSY}}$$

Meanwhile, the Total Allowable Catch (TAC) can be calculated using the formula (Purwanti et al., 2024b), as follows:

$$TAC = 80\% \times C_{MSY}$$

Research methodology steps are illustrated in Figure 2.

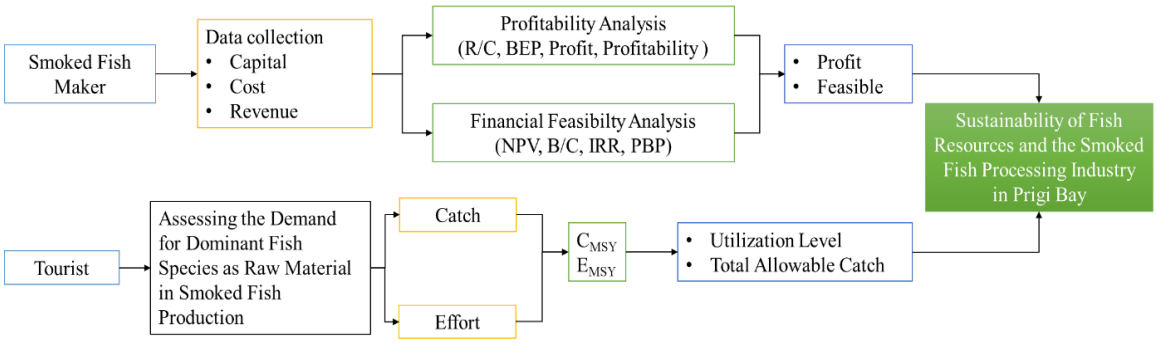



Figure 2. Research methodology steps

## RESULTS AND DISCUSSION

### Profitability and Financial Feasibility of Fish Smoking Business

The smoked fish production method encompasses fish washing, clamping, splitting, and smoking, with a length of 20-30 minutes. Fish smokers conduct smoking and marketing activities from 08:00 to 16:00 WIB. The procedures for smoking fish in Teluk Prigi are as follows:

1. Fish Cleaning involves the removal of contaminants from the fish and rinsing it with water to eliminate external contaminants. This procedure is employed to sustain the hygiene and quality of the fish.
2. Fish clamping is performed on the fish utilizing split bamboo. The fish is positioned between the bamboo openings and secured with wire at the ends. In contrast to larger fish, the fish will be segmented into many portions prior to being secured with 2-3 clamps.
3. Fish Clamping involves performing a cut on the side of the fish that is unaffected by the clamp. The separation seeks to ensure the fish meat cooks uniformly.
4. Smoking involves the first preparation of the smoking apparatus by igniting cob and pucung wood. The fish will be positioned in the smoker and subjected to smoking for roughly 20 to 30 minutes.

Capital refers to the financial resources allocated by the owner for the acquisition of buildings, machinery, and equipment that can be utilized again in initiating and operating a business (Fattah et al., 2019). The fish smoking business is conducted as a means of diversifying the fish catches from Prigi Bay to enhance value. A majority of smoked fish processors, around 66%, allocate fixed capital ranging from IDR 42,000,000 to IDR 62,000,000 (Tabel 1). This indicates that the fish smoking enterprise typically necessitates substantial capital for efficient operations, including the acquisition of smoking apparatus, freezers, and kiosks. The smoked fish kiosk in Prigi Bay serves for production and marketing purposes. The fish smoking enterprise in Prigi Bay employs a kiosk as its primary fixed asset, valued at IDR 41,000,000, with an annual depreciation of IDR 4,100,000 over a period of 10 years. Equipment including smokers, freezers, styrofoam, tables, knives, seats, plastic buckets, scissors, and hoses is likewise classified as fixed capital, possessing diverse values and useful lifespans. This depreciation computation aids in the proportional allocation of fixed capital costs based on the useful life of each asset.

Table 1. Fixed Capital of Fish Smoking Equipment (Source: Data analysis by the researchers, 2025)

| No | Fixed Capital Interval (IDR) | Number of Smokers | Percentage |
|---|---|---|---|
| 1 | <21,000,000 | 1 | 3% |
| 2 | >21,000,000 - 42,000 ,000 | 11 | 31% |
| 3 | >42,000,000 - 62,000,000 | 23 | 66% |

Cost refers to the sacrificial value expended to manufacture a product, categorized into two types: variable costs and fixed costs (Mujiarto et al., 2015). Fixed costs are expenses associated with the manufacture of goods or services that remain constant regardless of production volume, whereas variable costs are expenses that fluctuate in accordance with the level of output (Susadiana et al., 2023). The Teluk Prigi fish smoking enterprise incurs fixed expenditures, encompassing depreciation and operational maintenance, over the course of one year. Most fish smoking enterprises, approximately 74% of fish smokers, incur fixed expenditures ranging from IDR 5,000,000 to IDR 7,500,000 (Tabel 2). Fixed costs in the

smoked fish processing industry include depreciation and maintenance expenses. The average fixed capital depreciation expense amounts to IDR 5,360,267, representing the yearly allocation for diminishing the value of fixed assets, including smoking equipment, freezers, and commercial structures. Simultaneously, maintenance expenditures amounting to IDR 486,680 reflect regular costs necessary to preserve the operational state of industrial equipment and facilities, ensuring their optimal functionality. These two cost components are constant as they must be incurred consistently, regardless of variations in manufacturing volume. The predominance of depreciation costs over maintenance suggests that the original investment in fixed capital is vital for corporate operations. Effective management of these two costs is crucial for sustaining business continuity and profitability in smoked fish manufacturing over the long term.

Table 2. Fixed Costs of Fish Smoking (Source: Data analysis by the researchers, 2025)

| No | Fixed Costs Interval (IDR) | Number of Smokers | Percentage |
|---|---|---|---|
| 1 | <2,500,000 | 1 | 3% |
| 2 | >2,500,000 - 5,000,000 | 8 | 23% |
| 3 | >5,000,000 - 7,500,000 | 26 | 74% |

Table 3. Variable Costs of Fish Smoking (Source: Data analysis by the researchers, 2025)

| No | Variable Costs Interval (IDR) | Number of Smokers | Percentage |
|---|---|---|---|
| 1 | <57,000,000 | 3 | 9% |
| 2 | >57,000,000 - 112,000,000 | 22 | 63% |
| 3 | >112,000,000 - 170,000,000 | 10 | 29% |

Tabel 4. Mean Total Cost of Fish Smoking (Source: Data analysis by the researchers, 2025)

| No | Total Costs Interval (IDR) | Number of Smokers | Percentage |
|---|---|---|---|
| 1 | <60,000,000 | 3 | 9% |
| 2 | >60,000,000 - 120,000,000 | 19 | 54% |
| 3 | >120,000,000 - 180,000,000 | 13 | 37% |

The variable costs incurred by the majority of smoked fish processors ranged from IDR 57,000,000 to IDR 112,000,000, constituting 63% of total costs (Tabel 3). The primary elements of the variable costs associated with smoked fish processing at Prigi Bay comprise three categories: fish raw materials, materials supporting the smoking process, and operational expenses. The variable expenses for raw materials include skipjack tuna at IDR 21,600,000 per month, squid at IDR 18,000,000, and salmon at IDR 16,800,000. Variable costs for supporting materials, such as pucung wood, necessitate a budget allocation of IDR 9,000,000, while daily labor incurs substantial expenses of IDR 19,200,000 monthly. Operational expenses are transportation amounting to IDR 3,600,000, electricity totaling IDR 2,400,000, and fuel costing IDR 1,680,000. The annual variable cost requirement totals IDR151,740,000, averaging IDR12,595,000 monthly. The cost distribution pattern reveals that smoked fish production is predominantly reliant on the availability of fresh fish raw materials, constituting 76.3% of total variable costs, whereas 23.7% is designated for auxiliary materials and operations. This variable cost characteristic aligns with its nature, as it alters in relation to output volume. The whole cost encompasses all expenses associated with the production process. The total cost is derived from the aggregation of fixed expenses and variable costs associated with the fish smoking enterprise. The whole cost is crucial in ascertaining profitability. Most fish smoking enterprises, around 54%, necessitate a total expenditure ranging from IDR60,000,000 to IDR120,000,000 (Tabel 4).

Revenue is the total earnings received by producers in the form of monetary compensation derived from the sale of manufactured items. Revenue may also be defined as revenue derived from sales. Revenue can influence a company's profitability, as excessive production of a product may lead to a decline in price (Lawani et al., 2021). Revenue from smoked fish processing enterprises exhibits considerable fluctuation depending on the specific product manufactured. Salmon and squid each generated the highest revenue of IDR 36,000,000, albeit at differing unit costs (IDR 10,000 per unit for salmon and IDR 15,000 per unit for squid). Skipjack tuna generated income of IDR 34,560,000 from 1,728 units produced.


Figure 3. Processing of smoked fish

High-value products, including snapper, *salmon*, and *lemadang*, yielded revenues of IDR10,800,000, IDR10,800,000, and IDR7,200,000 correspondingly, with a selling price of IDR25,000 per unit. In contrast, products like stingray and hairtail contributed minimally, specifically: IDR6,000,000 and IDR6,300,000. Total revenue from processed smoked fish amounted to IDR194,100,000, with salmon, squid, and skipjack tuna accounting for 54.9% of this total (Figure 3).

**Profitability of Fish Smoking in Prigi Bay, Trenggalek Regency**

The smoked fish processing business assesses its profitability in Prigi Bay through the Revenue-Cost Ratio (R/C), Break Even Point (BEP), profit analysis, and profitability metrics (Tabel 5). The R/C ratio assesses business effectiveness by comparing total revenue to total costs, with a number greater than 1 signifying a profitable enterprise. The BEP analysis identifies the break-even point necessary to prevent business losses and indicates the degree of operational risk involved. The computation of profit directly measures the favorable disparity between revenue and expenses, serving as the primary sign of financial performance. Profitability assesses a business's capacity to yield returns on capital, indicating the efficiency of investment utilization. The feasibility of the Prigi Bay fish smoking business is supported by the R/C analysis, which indicates favorable outcomes exceeding 1. The R/C ratio for all fish goods is 1.23, indicating that the business is lucrative, as the R/C value exceeds 1. The business is deemed viable for short-term operation.

The Break Even Point (BEP) is an instance in which a business neither incurs losses nor generates profit, characterized by BEP units (BEPq) and BEP sales (BEPs) (Purwanti et al., 2024c). The BEP value of the fish smoking enterprise is lower than both the income for BEP sales and the quantity for BEPq, indicating that the business is profitable. The maximum BEP sales value pertains to salmon, amounting to IDR 4,969,076, with a BEPq value of 497 unit. The minimum BEP sales pertain to stingray, amounting to IDR 828,179. The items sold in the Teluk Prigi fish smoker above the overall breakeven point, indicating that the firm is profitable and viable for short-term operation. Profit is the disparity between revenue and spent expenses. Production expenses and revenue might influence profit. To determine a business's profit by deducting total costs from total income (Fattah et al., 2023b). The annual profit of the Teluk Prigi fish smoking enterprise amounts to IDR 36,513,053. The maximum profit was derived from the sale of Salmon and Squid, each amounting to IDR 6,771,127. The minimum profit was derived from the sale of stingray, totaling IDR 1,128,668. A short-term review of the fish smoking enterprise indicates feasibility, as evidenced by profitability reflected in the decrease of income relative to total costs.

The profitability of fish smoking in Teluk Prigi indicates a potential return on investment based on its profitability metrics. The value is 23%, indicating that the business is viable, as it exceeds the threshold by 12%. This indicates that a short-term financial analysis demonstrates the viability of the fish smoking enterprise in Teluk Prigi, given the offered products.

Table 5. Profitability Analysis of Fish Smoking Business (Source: Data analysis by the researchers, 2025)

| No | Analysis | Value | Criteria |
|---|---|---|---|
| 1 | R/C | 1.23 | R/C >1 |
| 2 | Profit | IDR 36,523,133 | TR>TC |
| 3 | BEPs | IDR 26,791,604 | BEPs<TR |
| 4 | $BEPq_{Elagatis\ bipinnulata}$ | 497 | $BEPq_{Elagatis\ bipinnulata} < Q_{Elagatis\ bipinnulata}$ |
| | $BEPq_{Thunnus\ albacares}$ | 139 | $BEPq_{Thunnus\ albacares} < Q_{Thunnus\ albacares}$ |
| | $BEPq_{Loligo\ sp.}$ | 331 | $BEPq_{Loligo\ sp.} < Q_{Loligo\ sp.}$ |
| | $BEPq_{Katsuwonus\ pelamis}$ | 239 | $BEPq_{Katsuwonus\ pelamis} < Q_{Katsuwonus\ pelamis}$ |
| | $BEPq_{Dasyatis\ sp}$ | 83 | $BEPq_{Dasyatis\ sp} < Q_{Dasyatis\ sp}$ |
| | $BEPq_{Lates\ calcarifer}$ | 60 | $BEPq_{Lates\ calcarifer} < Q_{Lates\ calcarifer}$ |
| | $BEPq_{Scomber\ australasicus}$ | 60 | $BEPq_{Scomber\ australasicus} < Q_{Scomber\ australasicus}$ |
| | $BEPq_{Euthynnus\ sp.}$ | 199 | $BEPq_{Euthynnus\ sp.} < Q_{Euthynnus\ sp.}$ |
| | $BEPq_{Decapterus\ kurroides}$ | 109 | $BEPq_{Decapterus\ kurroides} < Q_{Decapterus\ kurroides}$ |
| | $BEPq_{Trichiurus\ sp.}$ | 58 | $BEPq_{Trichiurus\ sp.} < Q_{Trichiurus\ sp.}$ |
| | $BEPq_{Coryphaena\ hippurus}$ | 40 | $BEPq_{Coryphaena\ hippurus} < Q_{Coryphaena\ hippurus}$ |
| 5 | Profitability Ratio | 23% | R>i |

Table 6. Financial Feasibility of Fish Smoking Business (Source: Data analysis by the researchers, 2025)

| **No** | **Long Term Financial Analysis** | **Result** | **General Information** |
|---|---|---|---|
| 1 | NPV | IDR155,836,128.11 | >0 (feasible) |
| 2 | Net B/C | 4.09 | >1 (feasible) |
| 3 | IRR | 72% | >12% deposit interest rate (feasible) |
| 4 | PBP | 1.38 | Time period for return of investment value |

**Financial Feasibility of Fish Smoking in Teluk Prigi, Trenggalek Regency**

The assessment of the financial viability of the smoked fish processing enterprise in Teluk Prigi employs the calculations of Net Present Value (NPV), Benefit-Cost Ratio (B/C), Internal Rate of Return (IRR), and Payback Period (PBP) (Tabel 6). The Net Present Value (NPV) evaluates corporate success by accounting for the time value of money, with a positive value signifying investment viability. B/C analysis evaluates investment effectiveness by comparing benefits to costs, with a ratio exceeding 1 signifying profitability. The internal rate of return (IRR) is deemed viable if it surpasses the benchmark interest rate. Simultaneously, PBP offers a summary of the return on investment capital velocity, wherein a reduced duration indicates diminished risk. The Net Present Value (NPV) of the Teluk Prigi fish smoking

business is IDR155,836,128.11, signifying that this venture is viable and profitable over a long-term horizon of ten years. A positive NPV signifies that the present value of cash inflows surpasses the present value of cash outflows after discounting at a reference interest rate of 12%. This outcome demonstrates the business's capacity to yield higher earnings relative to the incurred capital costs, while also signifying that investment in this fish smoking enterprise offers economic value added.

This ratio shows the contrast between the present value of net benefits acquired and the present value of expenditures spent over the analysis period. In the Teluk Prigi fish smoking enterprise, the Net B/C ratio of 4.09 signifies that each IDR1 spent will yield a net benefit of IDR4.09. This amount significantly surpasses the feasibility barrier (>1), indicating that the business is highly financially viable. The elevated Net B/C score signifies the business's efficacy in transforming capital into profit, while also suggesting favorable prospects for sustained business development. The Teluk Prigi fish smoking business yields an Internal Rate of Return (IRR) of 72%, far surpassing the benchmark interest rate of 12%.

The elevated IRR signifies that the internal rate of return from the investment in the fish smoking enterprise substantially exceeds the incurred capital costs, rendering this project very financially viable for implementation. The IRR of 72% indicates that this business can have an average annual profit rate of 72% throughout the investment period of 10 years, far surpassing the returns typically provided by Indonesian banks. The Teluk Prigi fish smoking business has a Payback Period (PP) of 1.38 years, corresponding to 1 year, 4 months, and 17 days, signifying a relatively brief investment return period. The PP score indicates that all original investment expenses can be recouped by cash inflows in under 1.5 years, signifying a low investment risk and favorable liquidity for the business. The financial viability of a smoked fish processing enterprise is contingent upon the accessibility of local raw materials, consistent market demand, manufacturing process efficacy, and competitive pricing. The long-term viability of a corporation requires a sustainable raw material management plan, effective manufacturing cost control, and continuous product innovation to sustain market competitiveness.

**Status of Fish Resources as Smoked Fish Products**

The main fish species utilized as raw materials for smoked fish comprise: blue mackerel fish, skipjack tuna, squid, mackerel, yellowfin tuna, and rainbow runner. Prigi National Fishing Port employs six fishing gears, comprising one ship purse seine, two ship purse seines, gill nets, payang, trolling rods, and hand lines. The mean catch of blue mackerel is 545,894 kg, the mean catch of skipjack tuna is 784,839 kg, the mean catch of squid is 34,174 kg, the mean catch of mackerel tuna is 7,819,691 kg, the mean catch of yellowfin tuna is 290,471 kg, and the mean catch of rainbow runner is 12,938 kg. In 2018, the maximum tuna capture reached 18,335,296 kg, surpassing other fish species. The lowest production of rainbow runner fish happened in 2019, totaling 2,233 kg. Tuna output has consistently been the highest annually from 2014 to 2023 in comparison to other fish species (Figure 4). The capture of the six fish species was accomplished utilizing the following fishing apparatus: purse seine (one vessel and two vessels), gill nets, umbrellas, trolling rods, and handlines. The mean number of fishing efforts conducted was 4,016 trips, with a minimum of 1,139 trips recorded in 2016 and a maximum of 5,422 trips in 2019. The mean fishing effort by fish type was 11,278 trips for blue mackerel fish, 484 excursions for skipjack tuna, 10,970 trips for catching skipjack tuna, 488 trips for yellowfin tuna, and 531 trips for rainbow runner fish. The greatest quantity of annual excursions yielded blue mackerel fish (Figure 5).

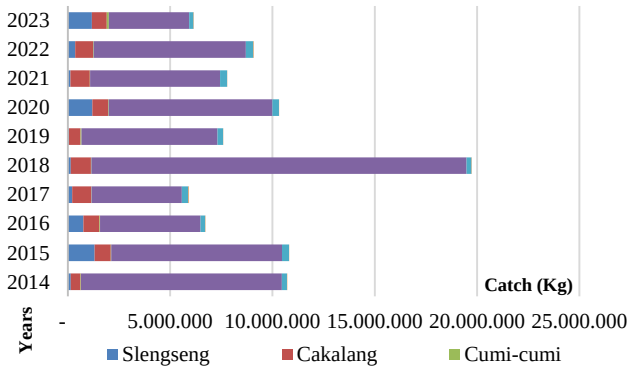



Figure 4. Fish Catch as the Main Raw Material for Smoked Fish (Source: Data analysis by the researchers, 2025)

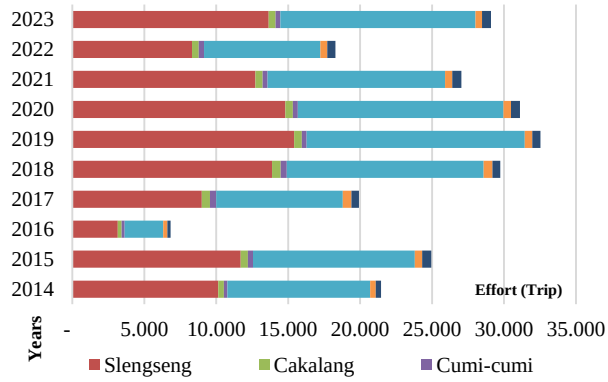



Figure 5. Fishing Efforts as the Main Raw Material for Smoked Fish (Source: Data analysis by the researchers, 2025)

The CPUE number quantifies the relationship between catch and effort in fishing, hence indicating the current status of the fish resource stock (Kartini et al., 2021). The maximum average CPUE is achieved using purse seine fishing gear with either one or two vessels. The primary fishing apparatus employed for capturing skipjack and yellowfin tuna is the purse seine (Sudrajat et al., 2022), whilst the handline fishing gear exhibits the lowest catch per unit effort (CPUE). The CPUE data spanning a decade from 2014 to 2023 indicate that the highest average CPUE was recorded in 2016 at 1,013.537, while the lowest average CPUE happened in 2019 at 361.52. The average catch per unit effort (CPUE) per fish type was 62.13 for blue mackerel fish, 1688.11 for skipjack tuna, 104.19 for squid, 812.76 for mackerel, 610.64 for yellowfin tuna, and 27.43 for rainbow runner fish (Figure 6). The Schaefer model assesses the probable sustainability of fish stocks by analyzing catch data and fishing attempts. Furthermore, it seeks to ascertain the optimal effort level for achieving maximum sustainable catches while preserving long-term stock productivity (Maximum Sustainable Yield) (Ardelia et al., 2018).

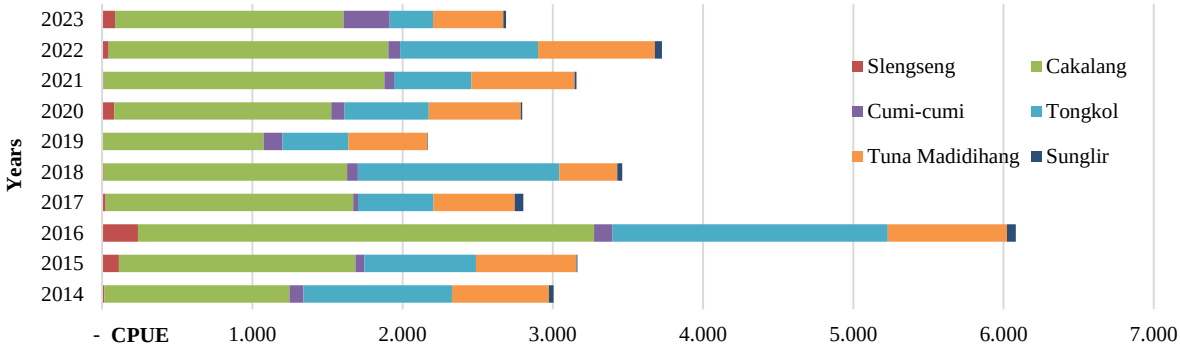



Figure 6. CPUE Value Based on Six Fish Species (Source: Data analysis by the researchers, 2025)

The $R^2$ value and p-value indicate the influence of the effort variable on the catch per unit of fish (CPUE) for each fish type. The values included in the Schaefer equation include a negative sign for parameter b, indicating that an increase in fishing effort may lead to a reduction in CPUE. The $R^2$ result for Blue mackerel fish indicates that the fishing effort variable accounts for 40.14% of the variation in catch per unit of fish (CPUE). For skipjack tuna, squid, mackerel, yellowfin tuna, and rainbow runner fish, the impact exceeds 40% of the fishing effort variable on the capture per unit of fish (CPUE).

Table 7. Constant Value, Coefficient, $R^2$, dan p-value (Source: Data analysis by the researchers, 2025)

| Indicators | Blue Mackerel | Skipjack Tuna | Squid | Mackerel | Tuna Yellowfin | Rainbow Runner |
|---|---|---|---|---|---|---|
| a | 201.57 | 3,428.80 | 205.74 | 1,762.50 | 1,041.22 | 81.35 |
| b | 0.0124 | 3.6001 | 0.2989 | 0.0865 | 0.8823 | 0.1016 |
| Equation | Y= 201.57 – 0.0124X | Y= 3,428.80 – 3.6001X | Y= 205.74 – 0.2989X | Y = 1,762.5 – 0.0865X | Y = 1,041.22 – 0.8823X | Y = 81.35 – 0.1016X |
| $R^2$ | 40.14% | 43.92% | 51.41% | 47.00% | 42.90% | 41.93% |
| p value | 0.049 | 0.037 | 0.029 | 0.029 | 0.040 | 0.043 |

The data processing results indicate that the standard effort variable on CPUE is significant, as it yields a p-value below 0.05 for all six fish species. Table 7 presents the Gordon-Schaefer equation for each fish species. The $C_{rill}$ value ((actual catch) indicates that the tuna commodity has the highest exploitation rate at 7,819,691 kg, significantly surpassing other species such as squid at 34,174 kg and rainbow runner at 12,938 kg. The juxtaposition of Crill and CMSY (Maximum Sustainable Yield) reveals that fish species will remain sustainable provided the harvest aligns with the sustainable prospective catch threshold (Figure 7). Fish species are classified as overfished when the fishing effort above the sustainable fishing effort ($E_{MSY}$).

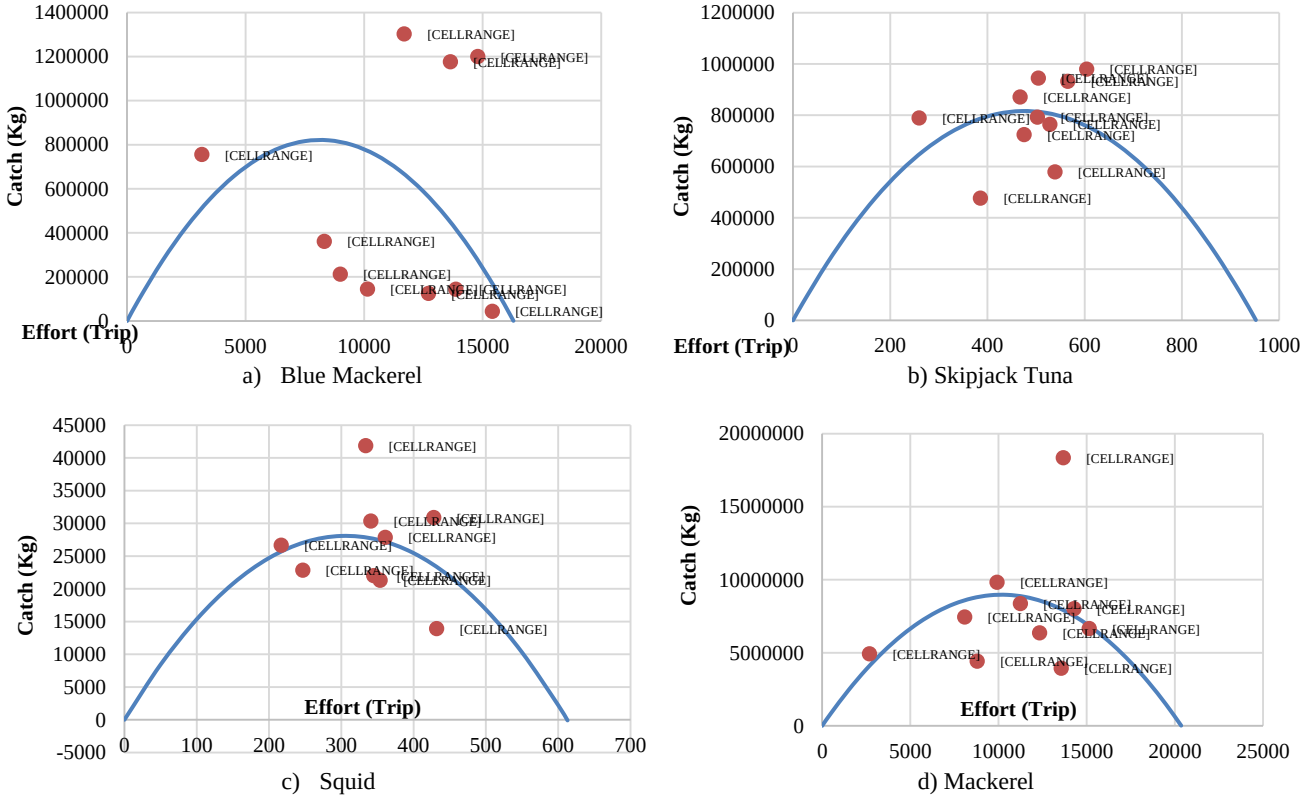
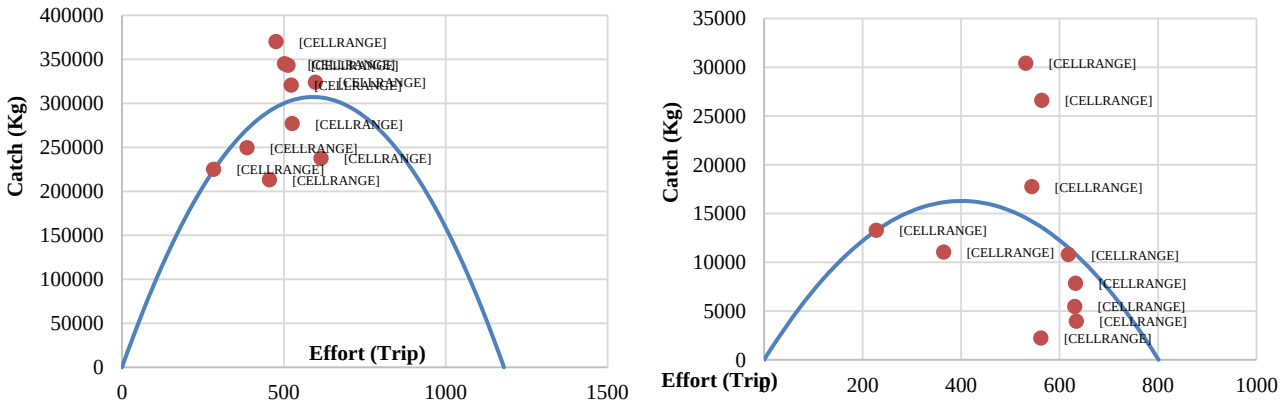



Figure 7a,b,c,d. Correlation betweek Effort and Catch Reliable, as well as Catch MSY (Source: Data analysis by the researchers, 2025)




e) Tuna Yellowfin f) Rainbow runner

Figure 7e,f. Correlation betweek Effort and Catch Reliable, as well as Catch MSY (Source: Data analysis by the researchers, 2025)

Five of the six fish species utilized as raw materials for smoked fish in Prigi Bay—blue mackerel, skipjack, squid, tuna, and rainbow runner—have undergone biological overfishing (Table 8). This state is defined by an $E_{riil}$ value beyond $E_{MSY}$, signifying that the exploitation level has surpassed the regenerative capacity of natural fish stocks.

The maximum fishing effort surpassing $E_{MSY}$ is represented by blue mackerel fish, yielding an Eriil of 11,278 trips, exceeding the $E_{MSY}$ s trips, and tuna, producing an Eriil of 10,976 trips, exceeding the $E_{MSY}$ = 10.184 trips, indicating significant fishing pressure and a potential threat to the sustainability of the fish stock.

The usage rate of blue mackerel fish, based on Maximum Sustainable Yield (MSY), is 821,580 kg, reflecting a utilization rate of 66.4%, indicating a fairly exploited status, whereas the permissible catch is 657,264 kg. Skipjack tuna, squid, mackerel, and yellowfin tuna have attained a fully exploited status, with permissible catch limits of 653,131 kg, 22,472 kg, 7,179,870 kg, and 245,739 kg, respectively. The usage percentage of rainbow runner fish is 79.4%, indicating a moderately exploited status, with an allowable capture of 13,034 kg. Conversely, Yellowfin Tuna has a distinct trend, wherein Eriil of 488 trips remains below EMSY of 590 trips, with a usage rate of 0.946 (Table 8).

This state indicates that the exploitation rate of Yellowfin Tuna remains within sustainable thresholds for the fish population in the wild, so it is not yet categorized as biological overfishing. The utilization rate nearing 1.0 signifies that yellowfin tuna has reached full exploitation, necessitating stringent measures to avert overexploitation.

The correlation between $C_{rill}$ and TAC (Table 8) indicates the exploitation state of fish resources in Prigi Bay. The majority of species have attained or beyond the Total Allowable Catch (TAC), particularly skipjack, squid, mackerel, and yellowfin tuna. Currently, blue mackerel and rainbow runner remain beneath the permissible catch limits. This discovery underscores the necessity for stringent regulation of catch quotas to rehabilitate overfished populations and avert the overexploitation of species nearing their maximum sustainable yield. The viability of fish resources and smoking initiatives in Prigi Bay is jeopardized without management intervention. Implementation of quota-based policies, restrictions on fishing equipment, and consistent stock monitoring are essential for the sustainability of fisheries in Prigi Bay.

Table 8. Production, Effort, Utilization Level and Allowable Catch (Source: Data analysis by the researchers, 2025)

| No | Types of Fish | $C_{rill}$ (kg) | $C_{MSY}$ (kg) | $E_{riil}$ (trip) | $E_{MSY}$ (trip) | UL | TAC (kg) |
|---|---|---|---|---|---|---|---|
| 1 | Blue Mackerel | 545,894 | 821,580 | 11,278 | 8,152 | 0.664 | 657,264 |
| 2 | Skipjack Tuna | 784,839 | 816,414 | 484 | 476 | 0.961 | 653,131 |
| 3 | Squid | 34,174 | 28,090 | 340 | 306 | 0.94 | 22,472 |
| 4 | Mackerel Tuna | 7,819,691 | 8,974,838 | 10,976 | 10,184 | 0.871 | 7,179,870 |
| 5 | Tuna Yellowfin | 290,471 | 307,174 | 488 | 590 | 0.946 | 245,739 |
| 6 | Rainbow Runner | 12,938 | 16,292 | 531 | 401 | 0.794 | 13,034 |

The production of local smoked fish products in coastal regions like Prigi Bay presents significant opportunities for enhancing the tourism industry and bolstering the local economy. Smoked fish products can serve as a regional emblem in culinary tourism, enhancing the tourist experience not only through the sale of processed goods but also via educational activities, such as traditional smoking demonstrations and fish processing workshops.

This advancement must be reconciled with the principle of sustainability, taking into account the condition of various fish species in Prigi Bay that have undergone overfishing, necessitating improved management measures, including: diversifying raw materials to include fish species that have not been overexploited, instituting catch quotas, establishing an ecolabel certification system to guarantee responsible fishing practices, and broadening sources of raw materials.

Smoked fish products will serve as a catalyst for the local economy by generating employment and enhancing the value of the harvest, while also providing an educational opportunity for tourists regarding the significance of conserving fishery resources. The collaboration of commercial entities, government, and the community in formulating a sustainable business model will guarantee that the utilization of fish resources for tourism aligns with the preservation of the marine ecosystem for future generations.

## CONCLUSION

The Teluk Prigi fish smoking business has demonstrated viability and profitability. The R/C ratio value of 1.23 or higher signifies profitability. Moreover, the Break Even Point (BEP) for all items is beneath actual revenue, with salmon exhibiting the greatest BEP sales and stingray the lowest, signifying that the business has surpassed the break-even threshold. Annual revenues amounted to IDR 36,513,053, predominantly driven by contributions from salmon and squid. The fish processing business's profitability of 23% signifies a strong capacity for capital return.

All financial measures, including the R/C ratio, BEP, profit, and profitability, indicate that the Teluk Prigi fish smoking business is viable for short-term operation. The smoked fish processing enterprise in Teluk Prigi is viable for long-term operation beyond a decade. The NPV of IDR 155,836,128.11 is positive, the Net B/C ratio is 4.09, exceeding 1, and the IRR is 72%, surpassing the interest rate of 12%. The Payback Period of 1.38 years, equivalent to 1 year, 4 months, and 17 days, indicates a swift return on investment, demonstrating that all financial metrics suggest this fish smoking enterprise is both viable and lucrative for development over the next decade.

The exploitation status of fish resources in Prigi Bay indicates that five of the six primary commodities— blue mackerel, skipjack, squid, mackarel tuna, and rainbow runner—have undergone biological overfishing, as evidenced by Eriil values beyond $E_{MSY}$. The highest degree of exploitation is observed in skipjack and blue mackerel, signifying fishing pressure that jeopardizes stock sustainability. The majority of species are in a fully exploited state, specifically: skipjack, squid, mackarel tuna, and yellowfin tuna, while moderately exploited species include: blue mackerel and rainbow runner. Although yellowfin tuna utilization levels are nearing full exploitation, they have not yet undergone biological overfishing.

This study offers an original perspective by combining financial analysis with data-driven ecological evaluation for conventional fish processing enterprises. The original findings encompass: (1) establishing economic viability despite the constraints posed by overfishing in five principal commodities, and (2) recognizing yellowfin tuna as a sustainable option with optimal use (not overfished) capable of sustaining high profitability. This research addresses the literature deficiency on sustainable business models in the small-scale fishing sector by employing an integrated economic-ecological framework.

Marketing and manufacturing strategies must concentrate on high-value commodities with substantial sales volumes to optimize the revenue of smoked fish processing enterprises. Smoked fish processing enterprises in Prigi Bay must diversify their raw material sources to adjacent regions, including Tulungagung Regency and Pacitan Regency, to guarantee a sustainable supply of raw materials. Collaboration among corporate entities, government, and scholars is essential to oversee fish population dynamics and formulate policies that promote ecological and economic equilibrium. Fish species that have beyond the $E_{MSY}$ threshold necessitate strategies such as cutting catch quotas, restricting fishing seasons, or establishing size limits to rehabilitate endangered stocks. Simultaneously, Yellowfin Tuna can be utilized effectively, provided there is stringent oversight to guarantee that $E_{riil}$ does not beyond $E_{MSY}$ in the future.

**Author Contributions:** Conceptualization, P.P. and D.S.; methodology, M.F. and P.P.; software, M.F. and C.A.I; validation, V.A.Q. and K.A.P. and B.F.; formal analysis, A.A. and V.A.Q. and P.P.; investigation, K.A.P. and B.F.; data curation, A.A. and K.A.P. and B.F. and D.S.; writing - original draft preparation, P.P. and M.F.; writing - review and editing, V.A.Q. and A.A. and K.A.P and M.F. and D.S.; visualization, P.P. and V.A.Q. and M.F.; supervision, P.P. and C.A.I.; project administration, D.S. and A.A. All authors have read and agreed to the published version of the manuscript.

**Funding:** Not applicable.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** The data presented in this study may be obtained on request from the corresponding author.

**Acknowledgements:** We want to express our profound appreciation to our institution, Universitas Brawijaya. This research would not have been possible without the research grant from DRPM Universitas Brawijaya.

**Conflicts of Interest:** The authors declare no conflict of interest.

## REFERENCES

Adirestuty, F., Ratnasari, R. T., Wardhana, A. K., Miraj, D. A., & Battour, M. (2025). Gastronomy of Religious Tourism: Overview and Future Research Agenda. *Geojournal of Tourism and Geosites*, 58(1), 188–199. https://doi.org/10.30892/gtg.58116-1401

Anandya, A., Sofiati, D., Puspa Wardani, M., Supriyadi, Fattah, M., & Musafak, A. (2023a). Analisis Kelayakan Finansial Usaha Pembenihan Ikan Patin Pada Fish Seed Warehouse, Kecamatan Diwek, Kabupaten Jombang [Financial Feasibility Analysis on Catfish Hatchery Business in Fish Seed Warehouse, Diwek Subdistrict, Jombang Regency]. *Journal of Fisheries and Marine Research*, 7(3), 79–88. https://doi.org/10.21776/ub.jfmr.2023.007.03.9

Anandya, A., Sofiati, D., Fattah, M., & Saifudin, M. A. (2023b). Evaluasi Kelayakan Finansial Usaha Budidaya Ikan Lele Sistem Boster Di Farm [Evaluation of the Financial Feasibility of Catfish Cultivation Using the Booster System at the Farm Fish Boster Center, Sidoarjo Regency]. *Jurnal Ilmiah Akutansi*, 4(1), 180–194. https://doi.org/10.30640/akuntansi45.v4i1.1056

Ardelia, V., Boer, M., & Yonvitner, Y. (2018). Precautionary Approach for (Euthynnus affinis, Cantor 1849) Resources Management in Sunda Strait. *Journal of Tropical Fisheries Management*, 1(1), 33–40. https://doi.org/10.29244/jppt.v1i1.20151

Cafiero, C., Palladino, M., Marcianò, C., & Romeo, G. (2019). Traditional Agri-Food Products as a Leverage to Motivate Tourists. *Journal of Place Management and Development*, 13(2), 195–214. https://doi.org/10.1108/jpmd-05-2019-0032

Chantakit, P., Rodjam, C., Saranontawat, K., Sukmaitree, J., & Arsingsamanan, P. (2022). Foundation Economic Development for Network Development Community Tourism by Linking Local Products and Cultural Capital Samut Songkhram Province. *International Journal of Health Sciences*, 6(S5), 1340–1354. https://doi.org/10.53730/ijhs.v6ns2.5206

Cordova-Buiza, F., Grillo-Torres, C. M., & Vega, C. R. (2025). Gastronomic Culture and Social Networks: the Impact of Digital Strategies on the Promotion of Traditional Colombian Cuisine. *Geojournal of Tourism and Geosites*, 59(2), 587–594. https://doi.org/10.30892/gtg.59207-1439

Fattah, M., Purwanti, P., Prasojo, F. I., Sofiati, D., Anandya, A., & Aisyah, D. (2023a). Revenue Cost Analysis of Sangkuriang Catfish Hatchery Business as Profitability Evaluation on DT. Farm Group, West Java. *Agriuma*, 5(2), 62–73. https://doi.org/10.31289/agri.v5i2.9305

Fattah, M., Tjahjono, A., Ghuffron, S. M., Sofiati, D., Aisyah, D., & Anandya, A. (2023b). Revenue Cost Analysis Dalam Mengukur Profit Usaha Budidaya Ikan Lele Mutiara Sistem Bioflok PT ABAI Kota Malang [Revenue Cost Analysis in Measuring Profit of Pearl Catfish Cultivation Business Using Biofloc System at PT ABAI Malang City]. *Jurnal Lemuru*, 5(2), 201–212.

Fattah, M., Utami, T. N., & Sofiati, D. (2019). Financial Feasibility And Sensitivity Of Gouramy Culture (Osphronemus gouramy) Business At Susuhbango Village, Kediri Regency. *Journal of Economic and Social of Fisheries and Marine*, 06(02), 202–208. http://dx.doi.org/10.21776/ub.ecsofim.2019.006.02.08.

Herman, G. V., Deac, L. A., Șandra, M., Bulz, C., Herman, M. L., Caciora, T., & Oanț, C. I. (2024). Analysis of the Degree of Knowledge and Perception Regarding the Development of Tourist Routes in Luncasprie Destination, Romania. *Geojournal of Tourism and Geosites*, 55(3), 997–1004. https://doi.org/10.30892/gtg.55301-1273

Herman, G. V., Tătar, C. F., Stașac, M. S., & Cosman, V. L. (2024). Exploring the Relationship between Tourist Perception and Motivation at a Museum Attraction. *Sustainability* (Switzerland), 16(1). https://doi.org/10.3390/su16010370

Indrayani, E., & Fattah, M. (2021). Bioekonomi Perikanan Pendekatan Statis dan Dinamis [Bioeconomics of Fisheries Static and Dynamic Approaches]. *UB Press*.

Intyas, C. A., Agus, T., & Fattah, M. (2019). Financial Feasibility Analysis Of Small-Scale Fish Smoking By Fisherman In Home Industries. *Russian Journal of Agricultural and Socio-Economic Sciences*, 12(December), 175–181. https://doi.org/10.18551/rjoas.2019-12.22

Kartini, N., Boer, M., & Affandi, R. (2021). Analysis of CPUE (Catch Per Unit Effort) and Sustainable Potential of Sardinella fimbriata Fishery Resources in Sunda Strait Waters. *Manfish Journal*, 1(03), 183–189. https://doi.org/10.31573/manfish.v1i03.271

Kurniawati, E., Kohar, U. H. A., Meiji, N. H. P., Handayati, P., & Ilies, D. C. (2022). Digital Transformation for Micro, Small, and Medium Enterprises to Develop Sustainable Community-Based Marine Tourism. *African Journal of Hospitality, Tourism and Leisure*, 11(3), 1118–1127. https://doi.org/10.46222/ajhtl.19770720.279

Mujiarto, A., Nusril, & Mulyasari, G. (2015). Optimization Combination Cultivation Of Catfish (Clarias sp) AND Patin Fish (Pangasius pangasius) In The Kuro Tidur Village Subdistrict Argamakmur North Bengkulu Regency. *AGRISEP*, 15(2), 189–202. https://doi.org/10.31186/jagrisep.14.2.189-202

Primyastanto, M., Intyas, C. A., & Fattah, M. (2021). Manajemen Mina Bisnis Komoditi Perikanan: Teori dan Aplikasi pada Komoditas Bandeng [Fishery Commodity Business Management: Theory and Application to Milkfish Commodities]. *Universitas Brawijaya Press.*

Purwanti, P., Sofiati, D., Intyas, C. A., Fattah, M., Qurrata, V. A., & Saputra, J. (2024a). Assessment of the Resources Sustainability Using Resource Utilisation and Catch Projection Approach: Case of Prigi Gulf Indonesia. *Journal of Sustainability Science and Management*, 19(7), 57–69. https://doi.org/10.46754/jssm.2024.07.004

Purwanti, P., Intyas, C. A., Sofiati, D., Fattah, M., & Anandya, A. (2024b). Evaluation of the Status of Squid Utilization as a Consideration for the Sustainability of Household Businesses Processing Smoked Squid in Prigi Bay, Trenggalek Regency. *Jurnal Sumberdaya Akuatik Indopasifik*, 8(3), 249–258. https://doi.org/10.46252/jsai-fpik-unipa.2024. 8.No.3.434

Purwanti, P., Sofiati, D., Anandya, A., Aisyah, D., Fattah, M., & Nurnuha, L. (2024c). Profitability of Fish Culture Using Budikdamber System Under Water Quality Control in Kediri City, Indonesia. *Tuijin Jishu/Journal of Propulsion Technology*, 45(1), 3198–3208.

Raihan, A., & Oktavianus, F. (2023). The Impact of Coastal Tourism Development on the Socio-Economic Conditions of Coastal Communities. *Riset Sains Dan Teknologi Kelautan*, 6(2), 147–152. https://doi.org/10.62012/sensistek.v6i2.31728

Rivza, B., Foris, D., Foris, T., Privitera, D., Uljanova, E., & Rivza, P. (2022). Gastronomic Heritage: a Contributor To Sustainable Local Tourism Development. *Geojournal of Tourism and Geosites* , 44(4), 1326–1334. https://doi.org/10.30892/gtg.44418-950

Safarov, B., Al-Smadi, H. M., Buzrukova, M., Janzakov, B., Ilieș, A., Grama, V., Ilieș, D. C., Vargáné, K. C., & Dávid, L. D. (2022). Forecasting the Volume of Tourism Services in Uzbekistan. *Sustainability* (Switzerland), 14(13), 1–18. https://doi.org/10.3390/su14137762

Sudrajat, D., Mualim, R., Hidayat, S., Handri, M., Choerudin, H., Nurlaela, E., Wibowo, B., Madyantoro, H. I., & Basith, A. (2022). Analysis of Catching Efforts Of Skipjact Tuna on Purse Seines in Nias Island Waters Arounded at PPN Sibolga. *Buletin Jalanidhitah Sarva Jivitam*, 4(2), 181. https://doi.org/10.15578/bjsj.v4i2.11695

Susadiana, Fattah, M., Purwanti, P., Sofiati, D., Anandya, A., & Aisyah, D. (2023). Evaluasi Profit dan Kelayakan Finansial Budidaya Pembesaran Ikan Lele Menggunakan Pakan Pelet pada Pokdakan Mina Tanjung Makmur Kabupaten Tulungagung [Profit and Financial Feasibility Evaluation of Catfish Enlargement Cultivation Using Pellet Feed in Pokd. *Jurnal Sumberdaya Akuatik Indopasifik*, 7(2), 135–142.

Sutiadiningsih, A., Mahfud, T., Dang, V. H., Purwidiani, N., Rachma Wati, G., & Dewi, I. H. P. (2024). The Role of Gastronomy Tourism on Revisit and Recommendation Intentions: the Mediation Analysis of Tourist Satisfaction. *GeoJournal of Tourism and Geosites*, 52(1), 195–202. https://doi.org/10.30892/gtg.52118-1195

Testa, R., Galati, A., Schifani, G., Trapani, A. M. D., & Migliore, G. (2019). Culinary Tourism Experiences in Agri-Tourism Destinations and Sustainable Consumption—Understanding Italian Tourists' Motivations. *Sustainability*, 11(17), 4588. https://doi.org/10.3390/su11174588

Vázquez-Martínez, U. J., Sanchís-Pedregosa, C., & Leal-Rodríguez, A. L. (2019). Is Gastronomy a Relevant Factor for Sustainable Tourism? An Empirical Analysis of Spain Country Brand. *Sustainability*, 11(9), 2696. https://doi.org/10.3390/su11092696

Woo, E., Uysal, M., & Sirgy, M. J. (2016). Tourism Impact and Stakeholders' Quality of Life. *Journal of Hospitality & Tourism Research*, 42(2), 260–286. https://doi.org/10.1177/1096348016654971

Yudha R., Asbi, A. M., & Putri, H. T. (2020). Analysis of Changes in Community Economic Behavior as an Impact of Community-Based Tourism Development. *Jurnal Nasional Pariwisata*, 12(1), 38–150.

Zhang, T., Chen, J., & Hu, B. (2019). Authenticity, Quality, and Loyalty: Local Food and Sustainable Tourism Experience. *Sustainability*, 11(12), 3437. https://doi.org/10.3390/su11123437

Article history: Received: 23.07.2025 Revised: 24.12.2025 Accepted: 20.01.2026 Available online: 06.02.2026