

Analysis of Fishing Operational Cost and Fishermen's Income at TPI Lappa, Sinjai Regency

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Abstract

Purpose: This study aims to analyze the fishing operational cost incurred by fishermen and the income they earn at *Tempat Pelelangan Ikan* or Fish Auction Center, Lappa in Sinjai Regency.

Methodology: A descriptive quantitative approach was applied. Respondents consisted of five active fishermen selected through purposive sampling based on at least five years of continuous fishing activity and regular sale of catch at Fish Landing Center (*Tempat Pelelangan Ikan* or TPI) Lappa. Data were collected through structured interviews, observation, and documentation, then analyzed using descriptive statistics covering operational cost, total revenue, net income, average values, and percentage share, presented in tabular form.

Results: The average operational cost incurred by fishermen reached IDR1,180,000 per trip. Fuel accounted for the largest component, averaging IDR700,000, followed by maintenance, consumption, and ice costs. Average total revenue reached IDR4,440,000 per trip, while average net income reached IDR3,260,000 per trip.

Conclusions: Efficient management of operational cost, particularly fuel use, plays a role in supporting higher net income among fishermen, while differences in income across respondents are also shaped by catch volume and selling price.

Limitations: The study involved only five fishermen and focused solely on operational cost and income, so the findings cannot be broadly generalized.

Contributions: This research offers an empirical picture of the operational cost structure and income of fishermen and may serve as a consideration in improving the efficiency of capture fisheries and the welfare of fishing households.

Keywords: *Capture Fisheries, Fish Auction Center, Fishermen's Income, Operational Cost, Sinjai Regency*

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1. Introduction

Coastal communities are groups whose livelihood depends heavily on marine resources, particularly fishing activity. For fishermen, the catch obtained from the sea is the primary source of income used to meet household needs. Fishermen income, however, is generally uncertain because it is shaped by a range of factors, including weather condition, fishing season, catch volume, fish price, and the operational cost incurred during each fishing trip (Allison, & Ellis, 2001; Cinner, Adger, Allison, Barnes, Brown, Cohen, Gelcich, Hicks, Hughes, Lau, Marshall, & Morrison, 2018). Sinjai Regency is one of the coastal areas in South Sulawesi Province that holds considerable fishery resource potential. Capture fisheries activity is one of the sectors contributing to the coastal community economy. Even

so, fishermen still face a range of challenges in running their livelihood, such as rising fuel prices, the cost of maintaining boats and fishing gear, unpredictable weather conditions, and fluctuating fish prices in the market ([Béné, Arthur, Norbury, Allison, Beveridge, Bush, Campling, Leschen, Little, Squires, Thilsted, Troell, & Williams, 2016](#)). These conditions cause fishing operational cost to keep rising, which has the potential to reduce fishermen's income when not matched by an optimal catch. Effective management of operational cost is therefore needed so that fishing activity continues to yield a profit for fishermen. Fishing activity carried out by fishermen functions not only as a source of livelihood but also as a pillar supporting the regional economy. Raising fishermen's income is therefore an important aspect of supporting the welfare of coastal communities ([Barange, Bahri, Beveridge, Cochrane, Funge-Smith, & Poulain, 2018](#)).

Fishermen income is the result obtained from fishing activity that is subsequently sold to consumers or through the Fish Auction Center, known locally as Tempat Pelelangan Ikan or TPI. The level of fishermen's income is strongly shaped by the revenue obtained from fish sales and the cost incurred during the catching process. According to the economic concept of business operation, net income is obtained from the difference between total revenue and total cost incurred in a business activity. Operational cost is therefore a factor that can determine the size of the income received by fishermen. Fishing operational cost refers to the entirety of expenditure a fisherman must incur to carry out fishing activity. Such cost covers fuel, ice, consumption during the trip, boat maintenance, and fishing gear maintenance. This expenditure must be incurred before the fisherman obtains any catch, making it an unavoidable cost component in capture fisheries activity ([Andersen, Nielsen, & Frost, 2012](#)). Previous studies have highlighted that fuel consumption and fishing equipment costs represent major components influencing fishing profitability, particularly for small-scale fisheries ([Tietze, Thiele, Lasch, Thomsen, & Rihan, 2011](#)).

This condition is also experienced by fishermen who carry out fishing activity and sell their catch at TPI Lappa, Sinjai Regency. Fishermen must incur various operational costs each time they go to sea without any guarantee regarding the volume of catch they will obtain. Under certain conditions, high operational cost is not proportional to the catch obtained, causing fishermen's income to be low. Conversely, when operational cost can be managed efficiently and yields an optimal catch, fishermen's income has the potential to rise. Various prior studies have examined the factors affecting fishermen's income, such as catch volume, weather condition, fishing season, and fish selling price ([Allison, Béné, & Andrew, 2012](#); [Cinner et al., 2018](#)). Research specifically describing fishing operational cost as the primary component affecting fishermen's income at the TPI Lappa location in Sinjai Regency, however, remains relatively limited. This study is expected to fill that research gap by providing a picture of the operational cost components incurred by fishermen and their relationship to the income obtained.

This research is important because operational cost is a primary component determining the size of fishermen's net income. By identifying the most dominant operational cost component and its relationship to fishermen's income, this study is expected to yield information useful as a basis for improving the efficiency of capture fisheries business and the welfare of coastal communities, particularly in Sinjai Regency. Building on the description above, this study is conducted to analyze the fishing operational cost incurred and the income obtained by fishermen at TPI Lappa, Sinjai Regency. The findings are expected to contribute to the development of management science, particularly in the field of fisheries economics, and to serve as a consideration for local government and related parties in formulating policy that supports improved fishermen welfare.

2. Literature Review

2.1 Fishing Operational Cost

Operational cost is the entirety of commercial cost incurred to support sales and administration in generating revenue, excluding expenditure already accounted for in cost of goods sold and depreciation. Operational cost can be defined as the cost used to run day-to-day business activity so that the production or service process can continue sustainably. Fishing operational cost refers to the entirety of expenditure a fisherman must incur to carry out fishing activity. Such cost is required so

that fishing activity can proceed properly and yield an optimal catch. In the capture fisheries sector, operational cost is an important component determining the size of the profit fishermen obtain. In carrying out fishing activity, a fisherman spends money on operational cost in order to be able to go to sea.

Operational cost is very much needed to support fishermen in the fish catching process. Fuel cost, ice cost, food and drink cost, and fishing gear cost are all part of operational cost. Operational cost has a significant relationship with fishermen's income. The greater the operational cost incurred without a corresponding increase in catch, the more the net income received by fishermen will decline. The fuel cost, duration at sea, and fish price are factors affecting the level of fishermen's income. Based on these findings, it can be understood that operational cost management is an important aspect in improving the efficiency of fishing business. This general pattern is echoed at a larger scale by evidence from Ghana, where [Owusu and Okpala \(2025\)](#), found that a sharp rise in fuel price directly reduced fishing frequency and household income among small-scale coastal fisherfolk, underscoring how sensitive fishing livelihoods are to fuel cost fluctuation across very different national contexts. Operational cost components identified in prior research include fuel, ice, and vessel repair expenses, which together shape the overall cost structure fishermen must manage ([Arif, Ariesta, & Puspitasari, 2022](#); [Al Fajrin, Jinan, Auliyah, Wulandari, & Tambunan, 2023](#)).

2.2 Fishermen's Income

Income is the amount of result received by a person or group as compensation for economic activity carried out within a given period. Income is the amount of earnings obtained by a resident from work performance over a particular period, whether daily, weekly, monthly, or yearly. In capture fisheries activity, fishermen's income is the result obtained from fish sales after deducting the various costs incurred during the catching process. Fishing is an occupation with irregular income and a high level of occupational risk, and fishermen's income is based on how much fish they obtain as well as the selling price in the market. Fish prices in the market are also known to frequently rise and fall in line with economic condition and public demand. Income refers to everything received from the sale of goods and services obtained within a business unit. In capture fisheries business, revenue is obtained from fish sales, while cost consists of the operational cost incurred during fishing. Fishermen income has also been shown to depend on subsidy support and adaptation strategies in the face of climate and market pressure ([Li, Pham Do, Shakur, & Sun, 2025](#); [Rahman, Toiba, & Huang, 2021](#)).

Fishermen income is the value received by a fisherman from the sale of catch, measured in Rupiah. Fishermen income is an important indicator in measuring the welfare level of coastal communities. Several factors affecting fishermen's income according to Sujarno include social and economic factors consisting of cost size, number of boats, number of workers, distance traveled, and experience. Regarding the education factor, fishing work does not require a high educational background, since fishermen tend to regard traditional fishing as manual labor that relies more on physical strength and experience. When catch increases and fish price is stable, fishermen's income tends to rise. Conversely, when operational cost increases or fish price falls, fishermen's income declines. Comparable findings from small-scale fisheries elsewhere show that fishermen's income and fuel consumption are closely linked, with geographic and socioeconomic variables shaping how significantly fuel use affects net earnings ([Purcell, Lalavanua, Cullis, & Cocks, 2018](#); [Evelinda & Suasih, 2023](#)).

Fishermen income is the difference between total revenue and operational cost, or total cost, which covers fuel, consumption, and fishing gear maintenance. This is consistent with Mandela et al., who state that gross income is obtained from total catch multiplied by average selling price, while net income is obtained after deducting fishing operational cost. Mathematically, income can be formulated as follows.

$$Income = TotalRevenue - TotalCost \quad (1)$$

The Formula 1 was used to calculate fishermen's net income by deducting the total operational cost incurred during fishing activities from the total revenue earned through the sale of fish catch. The resulting value represents the actual profit obtained after all production-related expenses have been accounted for and serves as an indicator of the economic return generated from fishing operations.

2.3 Fishermen

A fisherman is a person whose primary livelihood comes from fishing activity at sea or in other bodies of water. Fishermen are viewed not merely as a profession tied to the economic activity of fish catching but also as a community group with distinct social and economic characteristics. Fishermen make use of fishery resources as a source of income to meet their family's living needs. Fishermen are categorized into boat owners, crew workers, small-scale fishermen, traditional fishermen, transport fishermen, and fishing companies or industries. Fishermen's livelihood strategies and household economic roles, including the contribution of fishermen's wives to household income, have been documented across several coastal community studies ([Anang, Wahyurini, & Ferdiansyah, 2022](#); [Saksono, & Suadi, 2023](#)).

A fishing community is a group of people who make a living by catching fish. The catch a fisherman obtains determines the level of welfare that fisherman experiences, since a larger catch translates into greater income. Most fishermen in Sinjai Regency remain classified as small-scale fishermen who depend heavily on weather condition and fishing season.

2.4 The Fish Auction Center

The Fish Auction Center, known as Tempat Pelelangan Ikan or TPI, is a fishery marketing facility that functions as a venue for fish trading transactions between fishermen and buyers through an auction mechanism. TPI functions to ease the marketing of fishermen's catch while helping form a more transparent and competitive fish price. With TPI in place, fishermen have the opportunity to sell their catch to many buyers, allowing them to obtain a price more consistent with market condition. According to the Ministry of Marine Affairs and Fisheries, a Fish Auction Center is a facility provided to support fishery marketing activity and improve fishermen's welfare through an open auction system. TPI is an important link in the distribution chain of fishery products from fishermen to traders, collectors, processing industries, and consumers. The fish auction center's institutional and marketing functions, including its role in supporting local revenue and fishing business groups, have been examined in several regional case studies ([Ambo, Dinar, Mustari, Hasan, & Said, 2021](#); [Boari, Iindamon, & Rumaropen, 2022](#)).

TPI Lappa in Sinjai Regency is one of the centers of fisheries activity that plays an important role in supporting the coastal community economy. Most fishermen in the area sell their catch through TPI Lappa, making this location a distribution and marketing center for various types of sea catch. The presence of TPI Lappa therefore functions not only as a venue for fish trading transactions but also as a factor supporting higher fishermen's income and the development of the fisheries sector in Sinjai Regency ([Susilowati, & Purwandhini, 2022](#); [Sam, & Ismanudin, 2023](#)).

2.5 The Relationship Between Fishing Operational Cost and Fishermen's Income

In capture fisheries activity, fishing operational cost is an expenditure component fishermen must bear before obtaining any catch. The size of operational cost, which covers fuel, ice, consumption, and boat and fishing gear maintenance, can affect the net income a fisherman receives.

Theoretically, operational cost and income carry an inverse relationship. The higher the operational cost incurred without a corresponding increase in revenue, the more the net income a fisherman obtains will decline. Conversely, when operational cost is used effectively so that it raises catch volume and fish quality, fishermen's income will also rise. Operational cost management is therefore an important factor in sustaining capture fisheries business. Building on this theoretical foundation, this study develops three guiding propositions. Proposition one holds that fuel cost constitutes the dominant component of fishing operational cost among TPI Lappa fishermen. Proposition two holds that fishermen's income varies primarily according to catch volume and prevailing fish price rather

than operational cost alone. Proposition three holds that more efficient operational cost management is associated with a higher net income share among individual fishermen.

3. Research Methodology

3.1 Type of Research

This study employed a descriptive quantitative research approach to systematically examine the operational costs incurred by fishermen and the income generated from their fishing activities. This approach was selected because it facilitates the collection, organization, and analysis of numerical data to provide an objective and comprehensive description of the respondents' economic conditions. Rather than testing causal relationships, the study focuses on describing the characteristics and distribution of the observed variables based on empirical evidence. The collected data were analyzed using descriptive statistical techniques, including the calculation of total values, arithmetic means, percentages, minimum values, and maximum values, to summarize the magnitude, variation, and distribution of fishing operational costs and fishermen's income, thereby providing a clear overview of the financial conditions and economic outcomes experienced by the respondents ([Alatas & Umar, 2022](#)).

3.2 Research Location and Respondents

This research was conducted at the Fish Auction Center, TPI Lappa, in Sinjai Regency. Respondents were selected using a purposive sampling technique based on the following criteria: being an active fisherman, carrying out fishing activity on a regular basis, selling catch at TPI Lappa, and being willing to serve as a research respondent. This study involved five active fishermen as the primary respondents. The number of respondents was determined based on the suitability of respondent characteristics with the research purpose. Respondents were selected because they possess active fishing experience and are able to provide information related to operational cost and fishermen's income. All respondents had worked as fishermen for more than five years, regularly carried out fishing activity, and sold their catch at TPI Lappa, Sinjai Regency. Respondents were selected purposively because they were considered capable of providing information consistent with the research purpose ([Tobing & Hasibuan, 2022](#)).

3.3 Data Collection Technique

Research data were collected using multiple data collection techniques to ensure the completeness and accuracy of the information obtained. Structured interviews were conducted using a predetermined list of questions to gather quantitative data on fishermen's operational costs and income. In addition, direct observations were carried out at the Fish Landing Center (TPI) Lappa, Sinjai Regency, to examine fishermen's operational activities and gain contextual understanding of the fishing process. Documentation was also employed to support and validate the collected data through photographs of research activities and relevant supporting documents, thereby enhancing the credibility and comprehensiveness of the research findings ([Saragi, 2023](#)).

3.4 Data Analysis Technique

Operational cost analysis in this study was conducted to determine the total expenditure incurred by fishermen during fishing operations. The analysis includes all costs associated with fishing activities, both fixed and variable, to provide a comprehensive measure of operational expenses. The calculation follows the total cost as presented in Formula 2.

$$TC = FC + VC \quad (2)$$

Total operational cost is obtained by combining fixed costs and variable costs. Fixed costs refer to expenditures that remain relatively constant regardless of the frequency of fishing activities, whereas variable costs change according to the intensity and duration of fishing operations, including expenses such as fuel, ice, and food consumption.

Income analysis in this study begins with the calculation of total revenue generated from fishing activities. Total revenue reflects the gross earnings obtained from the sale of fish catch before any operational expenses are deducted. The calculation follows the total revenue as presented in Formula 3.

$$TR = P \times Q \quad (3)$$

Total revenue is calculated by multiplying the selling price of fish by the quantity of fish sold. The resulting value represents the gross income generated from fishing activities before operational costs are deducted.

To evaluate the economic returns obtained by fishermen, net income was calculated by considering both total revenue and total operational cost. This analysis provides an estimate of the actual earnings retained after all operational expenses have been deducted. The calculation follows the net income as presented in Formula 4.

$$\pi = TR - TC \quad (4)$$

Net income is obtained by deducting total operational costs from total revenue. The resulting value represents the actual profit earned by fishermen after all operational expenses have been accounted for and serves as an indicator of the economic return generated from each fishing operation ([Wanlem, Aujiरणpongpan, & Songkajon, 2023](#)).

4. Results and Discussions

4.1 General Overview of the Research Location

This research was conducted at the Fish Auction Center, TPI Lappa, in Sinjai Regency. TPI Lappa is one of the centers of capture fisheries activity that plays an important role in marketing fishermen's catch. Most fishermen in the coastal area of Sinjai Regency sell their catch through TPI Lappa, making this location a distribution center for various types of sea catch. Comparable coastal fishing economies elsewhere in Indonesia and the wider region have likewise been shown to depend heavily on local fish landing infrastructure and market access ([Apu, Manoppo, & Longdong, 2021](#); [Wartoyo & Nabila, 2023](#); [Rahman & Maulana, 2023](#); [Rosalia, Nurhayati, Kurniawan, & Herawati, 2021](#); [Nurfitriana, Saputra, & Mukani, 2022](#)).

Most communities living around the coastal area of Sinjai Regency depend on capture fisheries for their livelihood. Fishing activity is carried out nearly every day using boats and both traditional and modern fishing gear. The catch obtained consists of various types of sea fish subsequently sold through TPI Lappa. Auction activity typically takes place from morning to midday after fishermen return from the sea. The volume of catch entering the TPI often affects the fish price formed in the market. When catch volume rises, fish price tends to fall. Conversely, when catch volume is limited, fish price typically rises.

In carrying out fishing activity, a fisherman must incur a range of operational costs. Such cost covers fuel, ice, consumption during the trip, and the maintenance of fishing gear and boat engines. The size of operational cost incurred varies depending on weather condition, the distance to the fishing location, and the duration of the fishing trip. This study involved five informants who are active fishermen at TPI Lappa, Sinjai Regency. All informants were selected using a purposive sampling technique because they were considered capable of providing information consistent with the research need. Based on this condition, TPI Lappa plays a very important role in supporting fishermen's economic activity, particularly in the process of marketing their catch.

4.2 Analysis of Fishing Operational Cost at TPI Lappa, Sinjai Regency

The research findings indicate that fuel cost represents the largest operational expenditure incurred by fishermen during each fishing trip. The first respondent (R1) explained that fuel consumption is the primary cost component because fishing activities often require fishermen to travel considerable distances in search of fish resources. The amount of fuel used is influenced by the distance to the fishing ground and the duration of the fishing operation. As stated by R1, *“Our biggest expense is diesel fuel. If we go far to look for fish, a lot of fuel gets used up. We usually also buy ice and food to bring along.”* This statement illustrates that fuel is an essential input determining the continuity and operational capacity of fishing activities. The greater the distance travelled and the longer the fishing duration, the higher the fuel expenditure required by fishermen.

In addition to fuel expenditure, fishermen must also allocate costs for maintaining catch quality and ensuring the readiness of fishing equipment. The second respondent (R2) emphasized the importance of ice and maintenance costs, stating, *“If there's no ice, the fish spoils quickly. So it really has to be bought before we set out. Not to mention if the net gets damaged or the engine has a problem.”* This finding demonstrates that ice, fishing gear maintenance, and engine repairs are integral components of fishing operational costs because they support both the preservation of catch quality and the sustainability of fishing operations. Therefore, operational expenditure in capture fisheries is not limited to fuel consumption but also includes various supporting costs required to maintain the effectiveness, productivity, and continuity of fishing activities.

Based on data collected from five fishermen respondents at TPI Lappa, Sinjai Regency, it is known that fishing operational cost consists of fuel, ice, consumption during the trip, and the maintenance of fishing gear and boat engines. The detailed cost for each respondent is presented in Table below.

Table 1. Fishing operational cost per trip

Respondent	Fuel (IDR)	Ice (IDR)	Consumption (IDR)	Maintenance (IDR)	Total Operational Cost (IDR)
R1	700,000	120,000	180,000	200,000	1,200,000
R2	650,000	100,000	150,000	150,000	1,050,000
R3	800,000	120,000	180,000	250,000	1,350,000
R4	600,000	100,000	150,000	150,000	1,000,000
R5	750,000	120,000	180,000	250,000	1,300,000
Total	3,500,000	560,000	840,000	1,000,000	5,900,000
Average	700,000	112,000	168,000	200,000	1,180,000

Based on Table 1, it is known that the average operational cost incurred by fishermen is IDR1,180,000 for each fishing trip. The largest cost component is fuel, averaging IDR700,000, or around 59.32% of total operational cost. Next, fishing gear and boat engine maintenance cost averages Rp200,000, or 16.95%, consumption cost averages IDR168,000, or 14.24%, while ice cost is the smallest cost component, averaging IDR112,000, or 9.49%.

The size of fuel cost shows that fishing activity depends heavily on fuel use, particularly when fishermen must travel to a fishing ground fairly far from the coast. In addition, fishing gear and boat engine maintenance cost is also an important expenditure because it affects the smoothness of fishing activity. Meanwhile, ice cost is used to preserve fish quality and freshness up to the auction process, while consumption cost covers the fisherman's needs while at sea. This analysis result shows that fishing operational cost is dominated by fuel expenditure, so efficient fuel use is one factor that can help reduce operational cost and raise fishermen's net income.

4.3 Analysis of Fishermen's Income at TPI Lappa, Sinjai Regency

The findings reveal that fishermen's income is characterized by considerable uncertainty and fluctuation due to their strong dependence on natural conditions, seasonal patterns, catch availability, and market dynamics. Unlike occupations with relatively predictable income structures, fishing

livelihoods are highly exposed to external factors beyond fishermen's control. The respondents consistently identified catch volume and environmental conditions as major determinants influencing their daily earnings. The first respondent (R1) emphasized this uncertainty, stating, *"Our income isn't fixed. Sometimes we get a lot of fish, sometimes only a little. It depends on the weather and our luck at sea."* This statement illustrates that income instability is an inherent characteristic of fishing activities, where weather variability directly affects fishing opportunities by influencing the duration of fishing trips, accessibility to fishing areas, and the likelihood of obtaining sufficient catches. Therefore, fishermen's income generation is closely associated with their capacity to adapt to environmental uncertainty.

Seasonal variation was also identified as an important factor shaping fishermen's income conditions. The second respondent (R2) explained, *"During fish season, income is usually good. But when the weather is bad, it's also hard to get a large catch."* This experience indicates that fishermen tend to obtain higher income during periods of abundant fish availability, while unfavorable seasons create economic pressure due to reduced productivity. The third respondent (R3) further confirmed this condition by stating, *"There have also been times I came back from fishing with very little catch, so income wasn't very much."* These findings demonstrate that income variability occurs not only because of seasonal changes but also due to daily uncertainty associated with each fishing operation. Since operational costs must be incurred regardless of the catch obtained, fishermen face economic vulnerability when fishing outcomes do not correspond with the expenses invested.

Beyond production-related factors, the findings also demonstrate that market conditions, particularly fish price fluctuations, play an important role in determining fishermen's income. The fourth respondent (R4) explained, *"Sometimes we get a lot of fish, but the fish price drops because so much comes in at the auction."* This statement indicates that a higher catch volume does not necessarily guarantee higher income because fishermen remain dependent on market mechanisms and price formation processes. Conversely, favorable market conditions may improve earnings even when catch volume is relatively limited. As stated by the fifth respondent (R5), *"When the fish price is high, even if the catch isn't that large, the income is still decent."* Overall, these findings demonstrate that fishermen's income is shaped by the interaction between production factors, environmental uncertainty, and market dynamics. Consequently, improving fishermen's welfare requires not only increasing fishing productivity but also strengthening market access, improving risk management strategies, and enhancing fishermen's adaptive capacity in responding to environmental and economic challenges.

Table 2. Fishermen's income per fishing trip

Respondent	Total Revenue (Rp)	Total Operational Cost (Rp)	Net Income (Rp)
R1	4,500,000	1,200,000	3,300,000
R2	3,900,000	1,050,000	2,850,000
R3	5,200,000	1,350,000	3,850,000
R4	3,700,000	1,000,000	2,700,000
R5	4,900,000	1,300,000	3,600,000
Total	22,200,000	5,900,000	16,300,000
Average	4,440,000	1,180,000	3,260,000

Based on Table 2, it is known that fishermen's average total revenue is IDR4,440,000 for each fishing trip. After deducting the average operational cost of IDR1,180,000, the average net income obtained is IDR3,260,000 per trip. The third respondent obtained the highest net income, at IDR3,850,000, while the fourth respondent obtained the lowest net income, at IDR2,700,000. This income difference is shaped by the size of the catch obtained as well as the selling value of fish at TPI Lappa, Sinjai Regency.

Table 3. Percentage contribution of fishermen's net income

Respondent	Net Income (IDR)	Percentage (%)
<i>R1</i>	3,300,000	20.25
<i>R2</i>	2,850,000	17.48
<i>R3</i>	3,850,000	23.62
<i>R4</i>	2,700,000	16.56
<i>R5</i>	3,600,000	22.09
Total	16,300,000	100.00

Based on Table 3, it is known that the third respondent contributed the largest share of income, at 23.62%, while the smallest contribution came from the fourth respondent, at 16.56%. This difference shows that the size of fishermen's income is shaped by catch volume, fish selling price, and the efficiency of operational cost incurred during fishing activity.

Overall, the research results show that fishermen's income at TPI Lappa, Sinjai Regency, falls into a fairly good category, with an average net income of IDR3,260,000 per fishing trip. Even so, the income received by each fisherman still varies because it is shaped by weather condition, fishing location, catch volume, and fish selling price at the time of auction.

4.4 Discussion

Based on the analysis in Table 4.2, it is known that fishing operational cost is an important component that fishermen must prepare before carrying out fishing activity. The operational cost incurred by fishermen at TPI Lappa, Sinjai Regency, covers fuel, ice, consumption during the trip, and the maintenance of fishing gear and boat engines. Among all these components, fuel is the largest expenditure fishermen must bear. Rising fuel prices have been shown to place particular pressure on fishermen's operational cost and net income in several comparable studies, both within Indonesia and internationally ([Reza, & Rosita, 2023](#); [Wahyuni, 2022](#); [Owusu, & Okpala, 2025](#); [Wanlem, Aujiapongpan, & Songkajon, 2023](#)). Broader regional and institutional factors, including maritime governance arrangements and coastal tourism development, have also been found to shape fishing community income more indirectly ([Fauzil, & Burhanuddin, 2024](#); [Saragi, 2023](#); [Tobing, & Hasibuan, 2022](#); [Kamiyama, & Miyata, 2023](#); [Liese, & Crosson, 2023](#)).

The interview results show that the farther the fishing location, the greater the fuel requirement. In addition, ice use is also an important requirement for preserving fish quality and freshness during the catching process through to marketing. This finding is consistent with the view that fishing operational cost consists of fuel cost, ice cost, food and drink cost, and equipment cost used during fishing activity. These findings are also consistent with broader food-security research on small-scale fishing households, which finds that household economic resilience depends on a combination of income stability and access to institutional support by [Purwanti, Fattah, and Sulistyono \(2023\)](#), as well as with public-sector performance research emphasizing that institutional monitoring and accountability mechanisms shape how effectively support programs reach intended beneficiaries ([Andersen, & Nielsen, 2020](#); [Kolk, van der Meer-Kooistra, & Widener, 2022](#); [Fafchamps, 2020](#)).

This study also shows that fishermen's income is uncertain, or fluctuating. The income fishermen obtain is shaped by catch volume, fish selling price, and weather condition. When weather is favorable and catch increases, fishermen's income tends to rise. Conversely, when weather is poor or catch declines, fishermen's income also falls. This finding is consistent with the view that income is the result a person receives from economic activity carried out within a particular period. In capture fisheries activity, fishermen's income is obtained from fish sales after deducting the various costs incurred during the catching process ([Alatas & Umar, 2022](#)). Beyond catch volume, fish selling price is also a factor affecting fishermen's income. Based on the interview results, fishermen frequently experience a condition in which catch increases but fish price falls due to the large supply of fish

entering the Fish Auction Center. As a result, an increase in catch is not always followed by an increase in income ([Faisal & Habsyi, 2022](#)).

Based on the research findings, it can be understood that fishing operational cost and fishermen's income share a close relationship. The greater the operational cost incurred without a corresponding increase in catch, the more fishermen's net income tends to decline. Conversely, when operational cost incurred is able to raise catch volume and the value of fish sales, fishermen's income can rise. This finding is consistent with theory stating that operational cost and income are two closely related aspects in capture fisheries business activity.

The research results show that fuel is the largest operational cost component, averaging IDR700,000, or 59.32% of fishermen's total operational cost. This condition shows that fishing activity at TPI Lappa, Sinjai Regency, carries a fairly high level of dependence on fuel use. The size of fuel requirement is related to the distance of the fishing location and the duration of fishermen's activity at sea. The farther the fishing location, the greater the fuel use required. This finding is consistent with the view that changes and increases in fuel cost can affect business cost and fishermen's income. Efficient fuel use is therefore an important aspect of operational cost management in capture fisheries activity, a pattern with clear parallels beyond Indonesia as well, since [Owusu and Okpala \(2025\)](#) similarly found that rising fuel price directly squeezed the frequency of fishing trips and household income among small-scale coastal fisherfolk in Ghana.

Beyond fuel cost, fishing gear and boat engine maintenance cost also plays an important role in supporting the continuity of fishing activity. The research results show that the average maintenance cost incurred by fishermen is IDR200,000 per trip. Maintenance of the boat, engine, and fishing gear is required to reduce the risk of damage that could obstruct fishing activity. Should fishing gear or the boat engine break down, a fisherman may incur a larger additional cost and lose the opportunity to carry out fishing activity. Maintenance cost is therefore viewed not only as an operational expenditure but also as an effort by fishermen to sustain the continuity of their capture fisheries business ([Tietze, Thiele, Lasch, Thomsen, & Rihan, 2011](#)).

Consumption and ice cost are also an inseparable part of fishing activity. Consumption is needed to meet a fisherman's needs while at sea, while ice use aims to preserve the quality and freshness of the catch through to marketing at TPI Lappa. Sustained fish quality can affect the selling value of the catch. Should fish quality decline before sale, the price a fisherman receives has the potential to be lower. Ice use, although carrying the smallest cost proportion, therefore continues to provide benefit in maintaining catch quality and supporting fishermen's revenue ([Purcell, Lalavanua, Cullis, & Cocks, 2018](#)).

Based on the income analysis, average fishermen's total revenue reaches IDR4,440,000 per trip, while average net income after deducting operational cost reaches IDR3,260,000 per trip. This result shows that operational cost has a direct link with the net income fishermen receive. This is consistent with the view that operational cost is related to the level of fishermen's income. Should an increase in operational cost not be followed by an increase in catch and revenue, fishermen's net income can decline. Conversely, effective use of operational cost to support fishing activity can create an opportunity for fishermen to obtain a more optimal catch and income ([Allison, Béné, & Andrew, 2012](#)).

Fish price fluctuation at TPI Lappa is also a condition that needs attention. Based on the interview results, an increase in catch volume is not always followed by an increase in income because fish price can fall when the volume of supply entering the auction center increases. This condition shows that fishermen's income depends not only on the capacity to obtain a catch but is also shaped by market condition. This is consistent with the broader view that fish price instability can affect fishermen's earnings.

Beyond the operational cost factor, the success of fishing business is also shaped by a fisherman's capacity to manage business activity as a whole. Such management covers planning operational needs before going to sea, selecting an appropriate fishing location, making use of weather information, and regularly maintaining the boat and fishing gear. Sound planning can help fishermen reduce unnecessary expenditure and minimize the risk of equipment damage that could obstruct fishing activity. Business efficiency is therefore determined not only by the size of the cost incurred but also by the accuracy in allocating each operational cost component ([Allison & Ellis, 2001](#)).

5. Conclusions

5.1 Conclusion

Based on the research findings regarding fishing operational cost and fishermen's income at the Fish Auction Center, TPI Lappa, Sinjai Regency, it can be concluded that fishermen's fishing operational cost consists of fuel, ice, consumption, and the maintenance of fishing gear and boat engines. The average total operational cost incurred by fishermen is IDR1,180,000 for each fishing activity. The largest cost component is fuel, averaging IDR700,000, making fuel the primary factor determining the size of operational cost.

The research results also show that fishermen's average total revenue reaches IDR4,440,000 per fishing trip. After deducting operational cost, the average net income obtained is IDR3,260,000 per trip. The income difference across respondents is shaped by catch volume, fish selling price, and the size of operational cost incurred during fishing activity. Overall, this study shows that efficient operational cost management plays a role in supporting higher fishermen's income. The more efficient the operational cost expenditure and the better the catch obtained, the greater the net income fishermen at TPI Lappa, Sinjai Regency, can receive.

5.2 Research Limitations

This study carries several limitations that need to be taken into account when interpreting the research results. The study involved only five fishermen respondents at the Fish Auction Center, TPI Lappa, Sinjai Regency, so the research results cannot yet describe the condition of all fishermen in that area. The limited number of respondents means the research results are more descriptive in nature and cannot be broadly generalized. This study also only analyzes fishing operational cost and fishermen's income, so it has not considered other factors that may also affect income, such as weather condition, fishing season, distance to the fishing area, type of fishing gear, boat size, fisherman experience, and fish price fluctuation in the market.

This study applies a descriptive quantitative approach, so the analysis conducted is limited to presenting and describing operational cost and fishermen's income data without testing the relationship or influence between variables using inferential statistical analysis. The research results are therefore expected to serve as a foundation for future research involving a larger number of respondents and a more comprehensive analysis method.

5.3 Suggestions and Directions for Future Study

Based on the research results obtained, several directions can be offered. Fishermen are encouraged to manage operational cost more efficiently, particularly in fuel use and fishing gear maintenance, so that expenditure can be well controlled and the income obtained becomes more optimal. Local government and related agencies are encouraged to provide support to fishermen through fishery facility and infrastructure assistance programs, fisheries business management training, and easier access to fishing operational needs. Such support is expected to help raise fishermen's productivity and welfare. Future researchers are encouraged to conduct research with a larger number of informants and to examine other factors affecting fishermen's income so that a more comprehensive and in-depth research result can be obtained.

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Author Contributions

YAP contributed to conceptualization, data collection, fieldwork, formal analysis, and writing of the original draft. WOR contributed to methodology supervision, validation, review, and editing.

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