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Research

An empirical analysis of factors influencing Fishermen's net income: Evidence from Jawai Laut village, Indonesia

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ABSTRACT
Indonesia is recognized as an archipelagic state with vast marine resources, covering approximately 3.1 million km² or about 62% of the total national territory, presenting significant potential for fisheries development. However, traditional fishermen face various challenges, including declining fish catches due to overfishing, rising input costs, expensive fishing equipment, and environmental degradation, all of which directly affect their net income and welfare. This study aims to analyze the factors influencing fisherman's net income in Jawai Laut Village, South Jawai Subdistrict, Sambas Regency. The study employs a quantitative approach using primary data collected from 54 motorboat owning fishermen through structured interviews and questionnaires, complemented by secondary data from relevant institutions. The data were analyzed using a log-linear Cobb-Douglas net income model to estimate the elasticity of net income with respect to input cost variables, namely diesel prices, oil price, bait price, and labor wages. The results indicate that all input cost variables significantly affect fishermen's net income. Diesel price, bait price, and labor wages have a positive and significant effect, while oil price has a negative and significant effect. The model demonstrates strong explanatory power, with a coefficient of determination (R^2) of 0.868. These findings highlight the critical role of input cost dynamics in shaping fishermen's economic performance. Therefore, policies related to stabilizing fuel prices, ensuring input availability, and improving cost efficiency are essential to enhance the welfare of small-scale fishermen in coastal communities such as Jawai Laut Village.

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INTRODUCTION

Indonesia is widely recognized as an archipelagic state. The term "archipelago" is commonly translated into Indonesian as *kepulauan*, referring to a group of islands separated by the sea. When measured up to the 12 nautical mile territorial limit, Indonesia's territorial waters cover

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approximately 0.3 million km², while its archipelagic waters reach around 2.8 million km². Thus, Indonesia's total marine area is approximately 3.1 million km², or about 62% of the country's total territory (Buntoro, 2017). This vast marine potential positions fisheries as a strategic sector, yet its utilization largely depends on the characteristics and capacity of the fishermen who operate within it (Idda et al., 2009).

Fishermen in Indonesia generally have distinctive characteristics that can be identified from the scale of their fishing operations and the types of fishing gear they use. According to Bakhtiar et. al. (2020), traditional fishermen commonly rely on simple fishing equipment, such as nets and hooks, which often results in relatively low productivity. In addition, they tend to have limited capital and depend heavily on local coastal and marine resources. These structural limitations make traditional fishermen highly vulnerable to external pressures, particularly those affecting fish availability and operational sustainability.

The decline in fish catch in coastal and river waters often becomes a serious problem affecting various aspects of community life, particularly among traditional fishermen. This decline is driven by several factors, including overfishing, rising fuel prices, expensive fishing equipment, and water pollution, all of which reduce both the quantity and quality of fish catches. As a result, fishermen face increasing difficulties in maintaining catch productivity. The decrease in catch volume directly affects income because the revenue obtained is often insufficient to cover rising operational costs, particularly fuel and fishing equipment expenses (Effendi, 2016). This condition highlights that beyond ecological pressures and economic factors, especially input costs play a critical role in shaping fishermen's income dynamics (Reis-Filho et al., 2025).

Rising input prices, especially fuel and fishing equipment costs, have become a central issue that places considerable pressure on the income of traditional fishermen. However, previous studies have generally examined production factors in broad terms and have not specifically analyzed the sensitivity of fishermen's net income to changes in input prices, particularly in border coastal areas such as Sambas. This indicates a clear research gap, as several studies in Indonesia have investigated the determinants of fishermen's net income. However, limited attention has been given to the elasticity effects of specific input price components, such as diesel fuel, engine oil, bait, and labor wages, using a Cobb-Douglas approach in the fishing communities of Jawai Laut Village. This gap becomes increasingly relevant when considering the unique socio-economic and ecological conditions faced by fishing communities such as those in Jawai Laut Village.

The community of Jawai Laut Village depends heavily on the fisheries sector as its main source of livelihood. Nevertheless, fishermen in this area continue to face structural challenges that limit their economic welfare. Although fishing remains the primary economic activity, many fishing households remain vulnerable to poverty due to the imbalance between high production costs and fluctuating income. Data from the Central Bureau of Statistics of West Kalimantan Barat Province (2023), show that poverty among fishing communities remains a persistent issue, particularly under conditions of market volatility and limited access to productive resources. This condition underscores the need for a more rigorous economic analysis that explains how income is formed and affected within such constrained environments.

From an economic perspective, fishermen's net income is determined by the profit function, namely the difference between Total Revenue (TR) and Total Cost (TC). Therefore, income fluctuations are closely related to the elasticity of input prices and the efficiency of production activities. External factors such as diesel fuel, engine oil, and bait prices constitute major variable costs in fishing operations. An increase in these input prices raises operational costs and may reduce profit margins when it is not followed by a proportional increase in catch prices (Puspsosari, 2016); (Sumantri & Suwarli, 2006). Meanwhile, internal factors such as experience, technology adoption, and labor arrangements represent aspects of human capital and technical efficiency that influence productivity per fishing trip. Thus, fisherman's net income is not merely determined by market prices, but also by their ability to manage production inputs efficiently under the constraints of operational costs and labor wage systems (Duwila, 2022); (Siregar et al., 2022); (Saleh et al., 2023); (Norlinda, 2022). These theoretical and empirical considerations reinforce the importance of developing a more precise analytical approach to capture the role of input price elasticity in determining fishermen's net income.

This study utilizes a normalized Cobb–Douglas net income function to estimate the elasticity of fishermen's net income with respect to disaggregated input prices, namely diesel, oil, bait, and labor wages, within a coastal border fishing community. Unlike previous studies that predominantly examine production factors in aggregate, this study provides more precise and input-specific estimates of how individual input prices influence fishermen's net income in Jawai Laut Village. Furthermore, the incorporation of an input price elasticity framework into small-scale fisheries income analysis contributes to the empirical literature on coastal household economies and offers a more robust basis for policy formulation concerning input cost management and the enhancement of fishermen's welfare.

Given the urgency of the economic constraints described above, this study aims to analyze the determinants of fishermen's net income in Jawai Laut Village by applying the Cobb-

Douglas net income function model. Specifically, this research this research examines the simultaneous and partial effects of diesel prices, oil prices, bait prices, and labor wages on fishermen's net income. Through this approach, the study seeks to explain how variations in input prices shape income dynamics and to identify the most influential cost components affecting the economic performance of traditional fishermen in Jawai Laut Village.

METHOD

Study Area and Research Design

This study was conducted in Jawai Laut Village, South Jawai District, Sambas Regency, West Kalimantan. The study site was selected purposively because most household in the village depend on capture fisheries as their main source of livelihood. This condition makes the area relevant for examining the relationship between input prices and fishermen's net income in a coastal border fishing community. This study employed a quantitative research design using survey data. The analysis focused on estimating the effect of selected input price components, namely diesel, oil, bait, and labor wages, on fishermen's net income.

Data Sources and Sampling Procedure

The data used in the study consisted of primary and secondary data. Primary data were collected through direct field observations and structured interviews with vessel-owning fishermen. A closed-ended questionnaire was used to obtain consistent information on fishing income, input costs, and other relevant economic characteristics.

The population consisted of 116 vessel-owning fishermen in Jawai Laut Village. The sample size was determined using the Slovin formula with a 10% margin of error, resulting in 54 respondents. Respondents were selected to represent fishermen who actively operate fishing vessels and incur production input costs. Secondary data were obtained from relevant institutions, including the Central Bureau of Statistics of Sambas Regency and the Marine and Fisheries Office of Sambas Regency. These data were used to complement, verify, and contextualize the primary data.

Variables and Measurement

This study applied a log-linear Cobb–Douglas-type net income model to estimate the elasticity of fishermen's net income with respect to selected input cost components. Fishermen's net income was defined as profit, calculated as total revenue minus total production costs per fishing trip. Total revenue was obtained from the quantity of fish caught multiplied by the selling price, while total production costs consisted of fixed and variable costs, including diesel fuel, engine oil, bait, labor wages, and other operational expenses.

The dependent variable in the study is fishermen net income, measured in Indonesian rupiah (IDR/output price). The independent variables consist of input price component, namely diesel fuel (IDR/Liter), engine oil (IDR/Liter), bait (IDR/Kg), and labor wages (IDR/Trip). All variables were transformed into natural logarithmic form to estimate elasticity values. The variables used in the model are defined as follows:

Table 1. Operational Definition of Variables

Variable		Description
Y	Fishermen's net income	Net income calculated as total revenue minus total production costs per fishing trip (IDR/trip)
X_1	Diesel price	Average price of diesel fuel used in fishing operations (IDR/liter)
X_2	Oil price	Average price of engine oil required for boat engine maintenance (IDR/liter)
X_3	Bait price	Average cost of bait used during fishing activities (IDR/kg)
X_4	Labor wages	Total labor payment or revenue-sharing allocation paid to crew members per fishing trip (IDR/trip)

Model Specification and Data Analysis

The data were analyzed using a Cobb–Douglas-type net income function estimated through multiple linear regression. The Cobb–Douglas model was transformed into a natural logarithmic linear form to allow the regression coefficients to be interpreted as elasticity estimates. The empirical model is specified as follows:

$$LnY = \alpha + \beta_1 LnX_1 + \beta_2 LnX_2 + \beta_3 LnX_3 + \beta_4 LnX_4 + \mu$$

Where :

LnY : Logarithm of Natural of Fishermen's net income

α : Intercept

β_1-β_4 : Regression Coefficients

LnX_1 : Logarithm of Natural of Diesel Price

LnX_2 : Logarithm of Natural of Engine Oil Price

LnX_3 : Logarithm of Natural of Bait Price

LnX_4 : Logarithm of Natural of Labor Wages

μ *: Error Term*

The coefficients obtained from the logarithmic model indicate the percentage change in fishermen's net income associated with a one-percent change in each input price, holding other variables constant.

Classical Assumption Tests and Hypothesis Testing

Before estimating the regression model, several classical assumption tests were conducted to ensure the validity of the model. The normality of residuals was tested using the Kolmogorov–Smirnov test. Multicollinearity was examined using the variance inflation factor (VIF), with a VIF value below 10 indicating the absence of serious multicollinearity. Heteroscedasticity was tested using the Glejser test. The partial effect of each independent variable on fishermen's net income was examined using the t-test, while the simultaneous effect of all independent variables was assessed using the F-test. The coefficient of determination was used to evaluate the explanatory power of the model. All statistical analyses were performed using SPSS software.

RESULTS AND DISCUSSION

Overview of the Research Location

Jawai Laut Village is located in South Jawai District, Sambas Regency, West Kalimantan, Indonesia. The village covers approximately 29.84 km^2 and is situated near the Great Sambas River, around 2 km from the Natuna Sea. Its lowland coastal topography and proximity to marine waters make capture fisheries one of the main livelihood activities of the local community. Administratively, Jawai Laut Village was established in 1983 through the merger of two former villages, Bukit Raya and Ramayadi. This historical formation reflects the development of the village as a coastal settlement with strong social and economic ties to marine-based livelihoods.

Fishing activities in Jawai Laut Village are supported by diverse marine resources. Local fishermen commonly catch several fish and seafood species, including Gulama, Beard, Senangin, Shrimp, Mackerel, Bombay duck, and other small pelagic and demersal fish. But, Gulama fish are the most frequently caught. Among these species, Gulama is one of the most frequently caught and is highly valued by the local community due to its market value and consumer preference. Overall, the geographical position, coastal ecosystem, and dependence of local households on capture fisheries make Jawai Laut Village a relevant research site for analyzing the relationship between input costs and fishermen's net income in small-scale fishing communities.

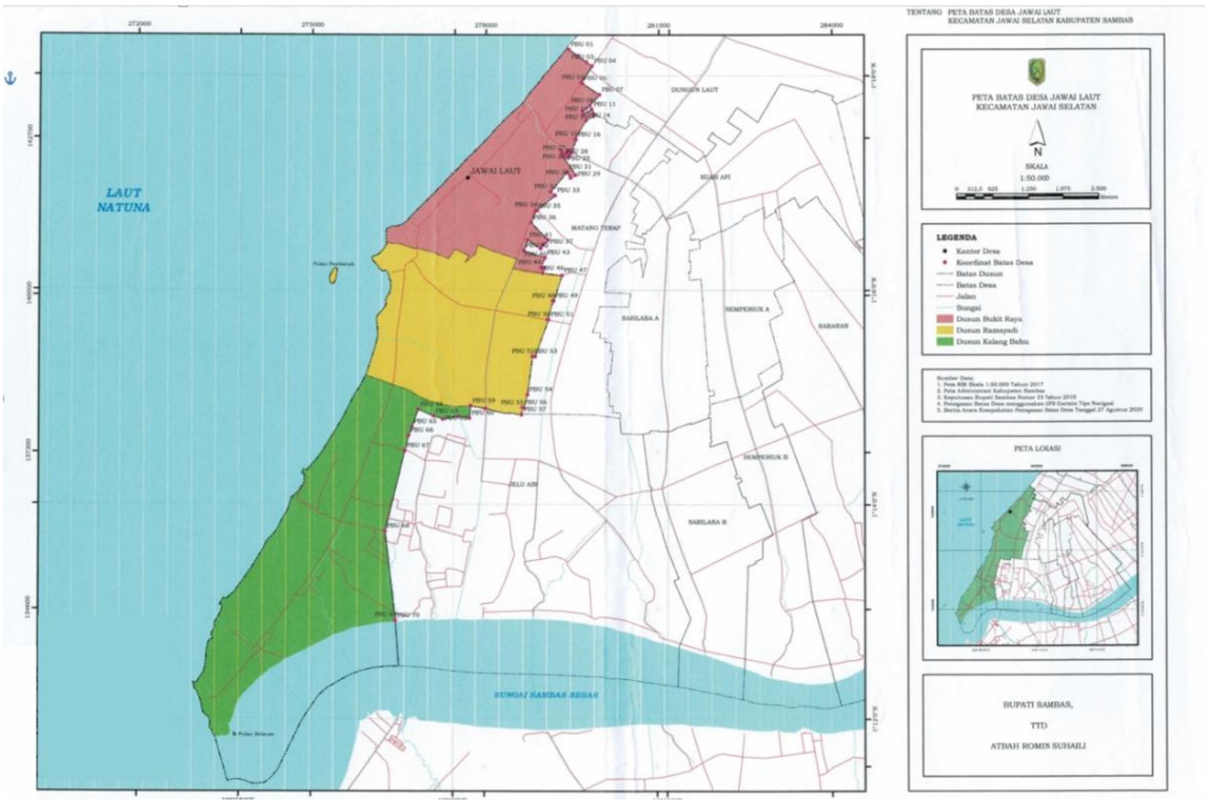

Figure 1. Jawai Laut Village Area Map

Source: Secondary Data, Jawai Laut Village Office, 2025

Respondent's Characteristics

The respondents in this study consisted of 54 fishermen, obtained through direct interviews using a questionnaire. Based on the research results, the most dominant age group is the range of 41 to 50 years, with a total of 19 people or about 35% of the total respondents. These findings show that the majority of responders are in the age range for productive work. (Putranto et al., 2023). All respondents involved in fishing activities in Jawai Laut Village are men. This data indicates that the main role in productive economic activities such as fishing is still dominated by men. According to Kotler in (Rasmikayati et al., 2020) the different orientations of men and women are based on genetics and socialization practices.

Most of the respondents, 27 people or 50%, only completed their education up to the elementary school level. Meanwhile, respondents with a junior high school education level numbered 16 people or 30%, and those who completed high school were only 11 people or about 20%. The dominance of respondents with basic education indicates that the majority of fishermen in this area have a low educational background. The majority of respondents have fishing experience ranging from 4 to 15 years, with a total of 20 people or about 37% of the total respondents. This fact indicates that the majority of capture fishermen in Jawai Laut

Village are relatively new to this profession and do not yet have extensive experience as traditional fishermen (Agam et al., 2023).

Description of Fisherman's Net Income

Fishermen's net income in this study refers to the profit obtained from capture fishing activities per fishing trip. It is calculated as the difference between total revenue from fish sales and total production costs incurred during fishing operations. This definition follows the income concept in capture fisheries, where income represents the remaining economic return after deducting the costs required to conduct fishing activities (Moniharapon et al., 2023).

Production costs are a key component in determining the profitability and efficiency of capture fisheries. In this study, production costs consist of fixed costs and variable costs (Mardianto et al., 2015). Fixed costs include the depreciation of motorboat engines and fishing gear. The average depreciation cost of motorboat engines was IDR 1,081 per trip, while the depreciation cost of fishing gear was IDR 6,461 per trip. Therefore, the total fixed cost incurred by fishermen was IDR 7,542 per trip.

Variable costs include diesel fuel, engine oil, bait, labor wages, and consumption costs. On average, fishermen spent IDR 21,204 per trip on diesel fuel, IDR 1,485 on engine oil, IDR 7,852 on bait, IDR 100,976 on labor wages, and IDR 20,556 on consumption. These components resulted in total variable costs of IDR 152,072 per fishing trip. The relatively large share of labor wages and fuel-related expenses indicates that fishing operations in Jawai Laut Village are highly dependent on operational inputs.

Table 2. Fisherman's Admission in Jawai Laut Village

Fish Name	Quantity	Price / Kg	Revenue
Gulama	3,44 Kg	IDR 10.698	IDR 36.801
Shrimp	1,96 Kg	IDR 39.431	IDR 77.285
Teri Nasi	3,63 Kg	IDR 10.878	IDR 39.487
Senangin	2,57 Kg	IDR 26.170	IDR 67.257
Lemuru	1,98 Kg	IDR 25.200	IDR 49.896
Parang	1,77 Kg	IDR 21.857	IDR 38.687
Tenggiri	1,92 Kg	IDR 27.500	IDR 52.800
Layur	1,63 Kg	IDR 20.000	IDR 32.600
Total	**18,90 Kg**	**IDR 181.734**	**IDR 394.813**

Source: Field Survei, 2025

Total revenue was obtained by multiplying the quantity of fish caught by the selling price of each fish species. The average catch per trip reached 18.90 kg, generating total revenue of IDR 394,813. Among the fishery commodities, shrimp contributed the highest revenue, amounting to IDR 77,285; despite its relatively small catch volume of 1.96 kg. This finding indicates that fishermen's revenue is not only determined by catch volume, but also by species composition and market price differences.

Based on the income formula, fishermen's net income is calculated as follows:

$$\text{Net Income } \pi = \text{Revenue (TR)} - \text{Total Production Cost (TC)}$$

$$\text{Net Income} = \text{IDR } 394{,}813 - \text{IDR } 152{,}072 = \text{IDR } 242{,}741$$

Thus, the average net income of fishermen in Jawai Laut Village was approximately IDR 242,741 per fishing trip. This value reflects the economic return received by fishermen after deducting production costs from gross revenue. However, net income remains sensitive to changes in catch volume, fish selling prices, and input costs, particularly diesel fuel, engine oil, bait, and labor wages. Therefore, According to Lee (2026) cost efficiency and access to affordable production inputs are important factors in improving the welfare of small-scale fishermen.

Classic Assumption Test

Normality Test

There are several approaches to test data normality, including graphical methods and statistical tests (Sinaga, 2023). According to Nasrum (2020), in addition to using graphical visualization, normality tests can also be conducted with non-parametric statistical approaches such as the Kolmogorov-Smirnov test, which measures the conformity of data to the normal cumulative distribution.

Table 3 presents the results of the One-Sample Kolmogorov-Smirnov test aimed at verifying the normality assumption of the regression residuals. The analysis yields a test statistic of 0.080 with an Asymptotic Significance (2-tailed) value of 0.200. According to established statistical criteria, residual data is considered normally distributed if the significance probability (p-value) exceeds the alpha level of 0.05 (Habibzadeh, 2024). Since the obtained p-value (0.200) is significantly greater than the 0.05 threshold (0.200 > 0.05), the null hypothesis cannot be rejected. Therefore, it can be concluded that the residuals in this regression model follow a normal distribution, thereby satisfying the prerequisite condition for classical assumption testing in the Ordinary Least Squares (OLS) analysis.

Table 3. Classical Assumption Test Results

Type of Analysis	Indicator	Main value	Criteria	Decision
Normality Test	K.S Statistic	Sig. = 0.200	Sig. > 0.05	Normality is met
Multicollinearity Test (Tolerance (T); VIF (I))	Ln (X_1)	T = 0.609; I = 1.641	T > 0.10; I < 10	No multicollinearity
	Ln (X_2)	T = 0.456; I = 2.193		No multicollinearity
	Ln (X_3)	T = 0.381; I = 2.624		No multicollinearity
	Ln (X_4)	T = 0.603; I = 1.659		No multicollinearity
Heteroscedasticity Test (Glejser test)	Ln (X_1)	Sig. = 0.202	Sig. > 0.05	No heteroscedasticity
	Ln (X_2)	Sig. = 0.925		No heteroscedasticity
	Ln (X_3)	Sig. = 0.460		No heteroscedasticity
	Ln (X_4)	Sig. = 0.391		No heteroscedasticity

Note: K.S.= Kolmogorov–Smirnov; Ln = Logarithm of Natural; X_1 = Diesel Price; X_2 = Engine Oil Price; X_3 = Bait Price; X_4 = Labor Wages

Source: Primary Data Analysis, 2025

Multicollinearity Test

According to Wibowo (2024), indications of multicollinearity symptoms can be identified through two main indicators, namely the variance inflation factor (VIF) and the tolerance value. If there is a high correlation, even close to perfect, among the independent variables in the model, it can be said that the model contains multicollinearity issues (Kolibu et al., 2024). Table 3 displays the Collinearity Statistics, specifically the Tolerance and Variance Inflation Factor (VIF) values, to detect potential intercorrelations among independent variables. The analysis reveals that all independent variables Diesel Price (LnX_1), Oil Price (LnX_2), Bait Price (LnX_3), and Labor Wages (LnX_4) possess Tolerance values greater than 0.10 (ranging from 0.381 to 0.609) and VIF values well below the critical threshold of 10.00 (ranging from 1.641 to 2.624). Based on the criteria established by (Gujarati, 2012) and (Kutner et al., 2005), the absence of VIF values exceeding 10 confirms that there is no serious multicollinearity present in the regression model. This implies that the independent variables are distinct and do not share a strong linear relationship, ensuring that the regression coefficients can be estimated precisely and unbiasedly.

Heteroscedasticity Test

The heteroscedasticity test is used to examine whether the variance of residuals differs from one observation to another in a regression model (Ghozali, 2018). A regression model is said to meet classical assumptions if it has constant residual variance across observations; this condition is known as homoscedasticity. The presence of homoscedasticity indicates that the regression model used is stable and reliable for estimation and prediction.

Table 3 displays the results of the Glejser Test, performed to detect the presence of heteroscedasticity by regressing the absolute residuals (e) against the independent variables. The analysis reveals that none of the independent variables have a statistically significant effect on the absolute residuals, as all obtained significance values (p-values) exceed the alpha = 0.05 threshold. Specifically, the significance values for Diesel Price (0.202), Oil Price (0.925), Bait Price (0.460), and Labor Wages (0.391) are all greater than 0.05. Furthermore, the constant term is also insignificant (p=0.263). These findings confirm that the variance of the residuals is constant across observations (homoscedasticity). Therefore, it can be concluded that the regression model is free from heteroscedasticity symptoms, ensuring that the estimators remain efficient and hypothesis testing is valid.

Factors Affecting Fisherman's Net Income

The estimation result of the Cobb-Douglas net income model are presented in Table 6. The model is employed to examine the effects of selected input cost components on fishermen's net income, including diesel fuel price, engine oil price, bait price, and labor wages as independent variables. Since the model is specified in natural logarithmic form, each regression coefficient can be interpreted as an elasticity, representing the percentage change in fishermen's net income associated with a one-percent change in each explanatory variable, holding other factors constant.

Table 4. Analysis of Factors Affecting Fisherman's Net Income Results

Variable	Coefficient	p-value	Decision
Constant	1.220	0.000	Significant
Diesel Price (LnX_1)	0.093	0.000	Positive and significant
Oil Price (LnX_2)	-1.229	0.000	Negative and significant
Bait Price (LnX_3)	0.155	0.012	Positive and significant
Labor Wages (LnX_4)	0.014	0.014	Positive and significant
R^2	0.868		
F-statistic	88.021	0.000	Significant

Source: Primary Data Analysis, 2025

The regression results show that all input cost variables significantly affect fishermen's net income. Diesel fuel price has a positive and significant effect on net income, with a coefficient of 0.093 and a p-value of 0.000. This indicates that a 1% increase in diesel fuel price is associated with a 0.093% increase in fishermen's net income, ceteris paribus. Although this positive relationship appears to contradict the conventional cost-income relationship, it may reflect the role of diesel fuel as a strategic operational input. Higher fuel expenditure may enable fishermen to travel farther or operate longer, thereby increasing the probability of obtaining higher catches and higher revenue.

Engine oil price has a negative and significant effect on fishermen's net income, with a coefficient of -1.229 and a p-value of 0.000. This result suggests that a 1% increase in engine oil price reduces fishermen's net income by approximately 1.229%, holding other factors constant. Unlike diesel fuel, engine oil functions primarily as a maintenance input and does not directly expand fishing range or increase catch volume. Therefore, an increase in engine oil price tends to raise operational costs and reduce profit margins.

Bait price also has a positive and significant effect on fishermen's net income, with a coefficient of 0.155 and a p-value of 0.012. This finding suggests that a 1% increase in bait expenditure is associated with a 0.155% increase in net income. The positive coefficient may indicate that higher-quality or more sufficient bait improves fishing effectiveness and contributes to better catch outcomes. However, the relatively small coefficient indicates that the elasticity of net income with respect to bait price is inelastic.

Labor wages have a positive and significant effect on fishermen's net income, with a coefficient of 0.014 and a p-value of 0.014. Although the magnitude of the coefficient is relatively small, this result indicates that labor remains an important operational factor in fishing activities. In the context of small-scale capture fisheries, labor payments are often linked to catch-sharing mechanisms, meaning that higher labor wages may reflect higher catch value and better fishing performance.

The coefficient of determination (R^2) shows that the independent variables explain 86.8% of the variation in fishermen's net income, while the remaining 13.2% is explained by other factors outside the model. In addition, the F-test result indicates that diesel fuel price, engine oil price, bait price, and labor wages simultaneously have a significant effect on fishermen's net income, with an F-statistic of 88.021 and a probability value of 0.000. Thus, the estimation model can be written as follow:

$$\mathrm{Ln}\,Fisherman's\_Net\_Income = 1.220 + 0.093\ \mathrm{Ln}\,Diesel\_Price - 1.229\ \mathrm{Ln}\,Oil\_Price + 0.155\ LnBait\_Price + 0.014\ \mathrm{Ln}\,Labor\_Wages$$

Input Cost Elasticities and Fisherman's Net Income

The estimation results show that fishermen's net income in Jawai Laut Village is strongly influenced by operational input costs, particularly diesel fuel, engine oil, bait, and labor wages. The model explains 86.8% of the variation in fishermen's net income, indicating that input cost components are central determinants of small-scale fishing profitability. The simultaneous test also confirms that these variables jointly have a statistically significant effect on fishermen's net income. This finding is consistent with the broader literature on small-scale fisheries, which emphasizes that operational costs, especially energy-related costs, directly shape the economic resilience and welfare of fishing households. FAO also notes that fuel costs increasingly affect fishers' and boat owners' net incomes, particularly in small-scale fisheries where cost-sharing and labor arrangements are important (Wilson, 1999).

The positive and significant coefficient of diesel fuel price indicates that diesel is not merely a cost item but also a strategic production input. In the context of Jawai Laut fisheries, higher diesel expenditure may allow fishermen to extend fishing distance, increase fishing duration, and access more productive fishing grounds. Therefore, the positive relationship between diesel fuel price and net income may reflect the role of fuel in expanding fishing effort and increasing the probability of higher catch revenue. This interpretation is consistent with Puspsosari (2016), who emphasized that fuel is a strategic input because it determines fishermen's mobility and fishing range. However, this result should be interpreted carefully. From a conventional cost perspective, rising fuel prices can reduce profitability when they are not accompanied by higher catches or higher selling prices. Recent evidence from small-scale coastal fisheries also shows that fuel price increases may raise fishing expenses, reduce fishing frequency, and place pressure on fisherfolk livelihoods (Owusu, 2025). Thus, the positive elasticity in this study likely reflects the productive use of diesel in fishing operations rather than the beneficial effect of fuel price increases themselves.

In contrast, engine oil price (X_2) has a negative and significant effect on fisherman's net income. This finding is theoretically consistent because engine oil is a maintenance-related input that increases operational costs but does not directly expand fishing range or catch volume. The estimated coefficient of -1.229 indicates that fishermen's net income is highly sensitive (elastic) to change in engine oil price. A one-percent increase in engine oil prices is associated with an approximately 1.229% decrease in net income, holding other factors constant. This result support Sumantri & Suwarli (2006), who argued that increases in engine oil prices raise operational costs and reduce fishermen's income when selling prices cannot be adjusted proportionally. In practical terms, engine oil represents an unavoidable cost for maintaining boat engine performance; therefore, Wang et al. (2018) state that price increases directly compress fishermen's profit margins.

Bait price (X_3) also has a positive and significant effect on fisherman's net income. This suggests that bait functions as a productivity-enhancing input rather than merely a production cost. Higher bait expenditure may indicate better bait quality, sufficient bait quantity, or more intensive fishing operations, all of which can improve catch performance. Nevertheless, the coefficient of 0.155 indicates an inelastic response, meaning that the effect of bait price on net income is positive but relatively small. This finding is consistent with Mimiatin et al. (2016), who explained that fishermen may reduce dependence on purchased bait by obtaining bait directly from nature, such as small fish or marine worms. Therefore, bait contributes to fishing effectiveness, but its impact on income is less dominant than fuel-related inputs.

Labor wages (X_4) have a positive and significant effect on fisherman's net income, although the coefficient is relatively small. This relationship can be explained by the labor-sharing system commonly found in small-scale fisheries. In such systems, labor payments are often linked to the value of the catch rather than treated as fixed wages. Therefore, higher labor wages may reflect higher catch value and better fishing outcome. This interpretation is consistent with Dady et al. (2016), who argued that revenue-sharing mechanism can function as an incentive system for crew members to improve fishing performance. However, the small elasticity also indicates that the marginal contribution of labor wages to net income is limited compared with other inputs, particularly diesel fuel and engine oil.

Overall, the findings demonstrate that fishermen's net income is shaped by the interaction between mobility-related inputs, maintenance costs, fishing effectiveness, and labor arrangements. Diesel fuel and bait appear to support income generation through their contribution to fishing effort and catch potential, while engine oil reduces net income because it increases maintenance costs without directly increasing output. Labor wages, meanwhile, reflect both production cost and the distribution of fishing returns under a share-based payment system. These results reinforce the argument that small-scale fisheries are economically vulnerable not only because of fluctuations in catch volume and fish prices, but also because of changes in input cost structures. Recent global evidence also highlights the importance of small-scale fisheries for livelihoods and food systems, with small-scale fisheries contributing substantially to global catch value and supporting the livelihoods of millions of people (Basurto et al., 2025).

The policy implication is that improving fishermen's welfare requires more than increasing production. Policies should also focus on stabilizing access to essential inputs, improving fuel-use efficiency, reducing maintenance cost burdens, and strengthening fair labor-sharing arrangements. In Jawai Laut Village, ensuring affordable and reliable access to diesel fuel is particularly important because fuel determines fishing range and operational intensity. At the same time, interventions that improve engine maintenance efficiency, promote cost-saving technologies, and strengthen market access may help reduce the vulnerability of fishermen's net income to input price fluctuations.

CONCLUSION

The results of the log-linear Cobb–Douglas net income model indicate that input cost components significantly affect fishermen's net income in Jawai Laut Village. Diesel fuel price, bait price, and labor wages have positive and significant effects on fishermen's net income, while engine oil price has a negative and significant effect. The negative coefficient of engine oil price suggests that increases in maintenance-related costs directly reduce fishermen's profit margins, making engine oil the most sensitive input cost affecting net income. In contrast, diesel fuel may function as a strategic operational input because higher fuel use enables fishermen to expand fishing distance and increase fishing effort, which may improve catch potential. Similarly, bait contributes to fishing effectiveness, while labor wages reflect the profit-sharing mechanism commonly applied in small-scale fisheries.

These findings highlight that fishermen's welfare is closely linked not only to catch volume and fish prices, but also to the structure and stability of input costs. Therefore, policy interventions should focus on ensuring the availability and affordability of essential fishing inputs, particularly diesel fuel and engine oil, improving access to working capital, promoting cost-efficient fishing practices, and strengthening fair profit-sharing arrangements. The Marine and Fisheries Office of Sambas Regency is expected to support fishermen through targeted input assistance, technical guidance, institutional strengthening, and programs aimed at improving the economic resilience of small-scale fishing households.

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