

Determinants of Fishermen's Income in Juru Banu Village, Paju Epat District, East Barito Regency, Central Kalimantan

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DOI: <https://doi.org/10.52403/ijrr.20260918>

ABSTRACT

This study analyzes the effects of business capital, fish price, number of fishing trips, fish production volume, and operational costs on fishermen's income in Juru Banu Village, Paju Epat District, East Barito Regency. A quantitative survey design was used. The population consisted of 167 capture fishermen operating outboard-engine boats, and 63 respondents were selected using Slovin's formula with a 10% margin of error and simple random sampling. Multiple linear regression was used to analyze the data. The independent variables simultaneously had a significant effect on fishermen's income. The coefficient of determination was $R^2 = 0.744$ (adjusted $R^2 = 0.721$), indicating that the model explained 74.4% of the variance in fishermen's income. Partially, fish price had a positive and highly significant effect ($t = 10.418$; $p < 0.001$) and was the dominant variable; a 1% increase in fish price was associated with a 2.738% increase in income. Production volume also had a positive effect at the 10% significance level ($t = 1.858$; $p = 0.068$); a 1% increase in production was associated

with a 0.226% increase in income. Business capital, number of fishing trips, and operational costs did not have statistically significant partial effects. The findings indicate that fish-price stability is the primary driver of improved economic welfare among capture fishermen.

Keywords: Fishermen's income, fish price, production volume, capture fisheries, multiple regression

INTRODUCTION

The fisheries sector is a strategic sector in the national economy, particularly for coastal communities whose livelihoods depend on marine and aquatic resources. One region possessing substantial inland aquatic fisheries potential is East Barito Regency, Central Kalimantan Province. This regency is supported by the existence of rivers, swamps, and other open public waters that serve as habitats for various economically valuable freshwater fish species. This potential makes the fisheries sector a critical driver in supporting the regional economy and providing employment opportunities for the local

community. Based on data from the East Barito Regency Fisheries Office (2026), during the 2021–2025 period, the total capture fisheries production in Paju Epat District reached 1,361,865 kg. This high level of production indicates that the capture fisheries sector plays an essential role in sustaining local economic activities. One of the villages with a highly dominant capture fisheries activity in Paju Epat District is Juru Banu Village. Juru Banu Village covers an area of approximately 27 km² with a population of 557 inhabitants. Among these, 167 individuals work as fishermen, making the fisheries sector the primary source of livelihood for the village community. This condition demonstrates that the sustainability of capture fisheries enterprises exerts a substantial influence on the level of community welfare in Juru Banu Village. Geographically, Juru Banu Village is surrounded by swamp water areas characterized by a blackwater ecosystem, which serves as a habitat for various economically valuable freshwater fish species. The diversity of fish resources in this area is quite broad, including baung (*Hemibagrus nemurus*), haruan/snakehead (*Channa striata*), papuyu/climbing perch (*Anabas testudineus*), biawan/kissing gourami (*Helostoma temminckii*), tawes/Java barb (*Barbonymus gonionotus*), lele/catfish (*Clarias* sp.), kapar (*Belontia hasselti*), patung (*Pristolepis fasciata*), lais (*Kryptopterus* spp.), tapah (*Wallago* sp.), and toman/giant snakehead (*Channa micropeltes*). This diversity of fish species constitutes the main catch for local fishermen, which is subsequently marketed to fulfill household economic needs.

Fishing activities in Juru Banu Village generally utilize outboard-engine boats as the main mode of transportation to fishing grounds. In a single month, fishermen conduct an average of 15 to 20 fishing trips. Each fishing trip yields approximately 9 to 13 kilograms of fish, depending on weather conditions, seasonal variation, and the availability of fish resources in the waters. The primary fishing gear commonly used by

local fishermen includes tempirai (bamboo traps), selambau (lift nets), rengge (gillnets), lunta (cast nets), and lukah (funnel traps), tailored to the characteristics of swamp waters and target fish species. High dependence on the fisheries sector renders the community's economic well-being highly susceptible to the success of fishing operations. Declining fish production, rising operational costs, fluctuations in fish selling prices, and reduced fishing trip frequencies can directly impact fishermen's income levels. Therefore, it is imperative to identify the factors influencing fishermen's income to formulate appropriate policies and strategies for enhancing the welfare of fishing households in Juru Banu Village.

Theoretically, fishermen's income is influenced by various factors related to production activities and the marketing of fishery products. Fishermen's net income is defined as a function of gross revenue minus operational costs. Revenue is determined by catch volume and commodity selling price, whereas the production process is supported by capital capacity, operational cost efficiency, labor allocation, and fishing trip frequency. Previous empirical studies demonstrate varying results; several studies found that price and production volume dominate income formation, whereas others emphasized the critical role of capital effectiveness and trip efficiency. Based on this context, this study aims to analyze the effects of business capital, fish selling price, number of fishing trips, fish production volume, and operational costs on fishermen's income in Juru Banu Village, Paju Epat District, East Barito Regency.

MATERIALS & METHODS

Research Time, Location, and Design

This study was conducted in Juru Banu Village, Paju Epat District, East Barito Regency, Central Kalimantan Province, from March to June 2026. This research employed a quantitative research design utilizing a survey approach.

Population and Sample

The study population comprised all 167 capture fishermen operating outboard-engine boats in Juru Banu Village. The sample size was determined using Slovin's formula with a margin of error tolerance of 10%, yielding a total of 63 respondents. A simple random sampling technique was applied to select the respondents.

Data Collection Techniques

Primary data were gathered through structured interviews using standardized questionnaires and field observations. Secondary data were collected from relevant administrative agencies, including the Department of Fisheries and Livestock of East Barito Regency, along with relevant scientific literature.

Data Analysis Techniques

Data analysis was conducted using Multiple Linear Regression with a natural logarithm transformation (*Double-Log / Cobb-Douglas Model*) to measure elasticity and relationships between variables while mitigating potential heteroskedasticity issues in the dataset. The regression equation is formulated as follows:

$$\ln Y = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + e$$

Where:

Y = Fishermen's net income (IDR/month)

X₁ = Business capital (IDR)

X₂ = Average fish price (IDR/kg)

X₃ = Number of fishing trips (trips/month)

X₄ = Fish production volume (kg/month)

X₅ = Monthly operational costs (IDR/month)

α = Constant

β₁, β₂, β₃, β₄, β₅ = Regression coefficients (elasticities)

e = Error term

Prior to regression estimation, Classical Assumption Tests were performed, including the Normality Test (P-P Plot), Multicollinearity Test (Tolerance > 0.10 and VIF < 10), and Heteroskedasticity Test (Scatterplot). Hypothesis testing was conducted via the Coefficient of Determination (R²), Simultaneous

Significance Test (F-test), and Partial Significance Test (t-test) at significance levels of α = 5% and α = 10%.

RESULTS AND DISCUSSION

Classical Assumption Tests

Normality Test

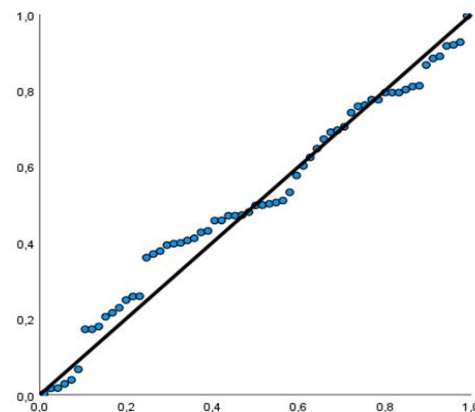


Figure 1. Normal P-P plot of regression standardized residuals

The Normal P-P Plot shows the data points clustered closely along the diagonal line, indicating that the model residuals are normally distributed.

Multicollinearity Test

All independent variables exhibited Tolerance values > 0.10 (ranging from 0.570 to 0.891) and VIF values < 10 (ranging from 1.122 to 1.754), confirming the absence of multicollinearity in the regression model.

Heteroskedasticity Test

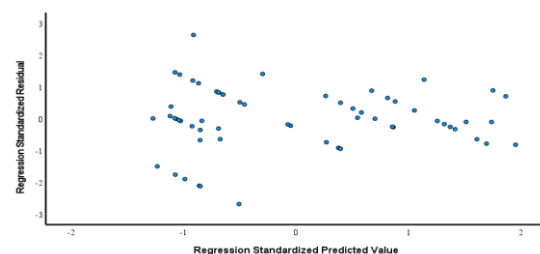


Figure 2. Scatterplot for the heteroskedasticity test

The scatterplot shows a random distribution of data points above and below the value of 0 without forming a regular pattern, confirming the absence of heteroskedasticity.

Multiple Linear Regression Analysis

The results of the natural logarithm-based multiple regression analysis (Double-Log model) are presented in Table 1 below:

Table 1. Double-Log Multiple Linear Regression Estimation Results

Variable	Coefficient (β)	t-statistic	Sig.	Description
(Constant)	-7.645	-2.249	0.028	-
Business Capital (ln X_1)	-0.176	-1.235	0.222	Not Significant
Fish Price (ln X_2)	2.738	10.418	< 0.001	Significant ($\alpha = 5\%$)
Number of Trips (ln X_3)	0.048	0.233	0.816	Not Significant
Production Volume (ln X_4)	0.226	1.858	0.068	Significant ($\alpha = 10\%$)
Operational Costs (ln X_5)	-0.243	-1.469	0.147	Not Significant

$R^2 = 0.744$; adjusted $R^2 = 0.721$; F-statistic = 33.051; $p < 0.001$. Source: Primary data processed (2026).

The resulting regression equation is expressed as:

$$\ln Y = -7.645 - 0.176 \ln X_1 + 2.738 \ln X_2 + 0.048 \ln X_3 + 0.226 \ln X_4 - 0.243 \ln X_5$$

Hypothesis Testing

Simultaneous Test (F-Test)

The calculated F-statistic of 33.051 with $p < 0.001$ demonstrates that business capital, fish price, number of fishing trips, production volume, and operational costs simultaneously have a statistically significant effect on fishermen's income.

Coefficient of Determination (R^2)

An R^2 value of 0.744 indicates that 74.4% of the variance in fishermen's income is explained by the five independent variables in the model, while the remaining 25.6% is influenced by factors outside the scope of this research model.

DISCUSSION

Effect of Fish Price (X_2) on Income

Fish price was the most dominant determinant, with a standardized coefficient (Beta = 0.802) and a t-statistic of 10.418 ($p < 0.001$). The elasticity coefficient of 2.738 indicates that a 1% increase in fish price is associated with a 2.738% increase in fishermen's income. This result is consistent with total revenue theory ($TR = P \times Q$), in which revenue is directly influenced by the selling price. The finding is also consistent with Jamal and Multifiah (2016), who emphasized that market-price fluctuations affect the net revenue of fisheries businesses and that price stability supports business

sustainability. Prasetyo and Kurniati (2020) similarly concluded that changes in fishery commodity prices contribute directly to the economic welfare of fishing households compared with other physical production factors.

Effect of Production Volume (X_4) on Income

Production volume had a positive and statistically significant effect at the 10% significance level ($t = 1.858$; $p = 0.068$), with an elasticity of 0.226. An increase in catch volume expands total revenue and improves the margin over fixed and variable costs. This finding supports Asrofiyah and Arka (2023), who identified productivity or catch volume as a primary driver of increases in fishermen's real income.

Effects of Capital (X_1), Fishing Trips (X_3), and Operational Costs (X_5)

Business Capital (X_1): Does not have a statistically significant effect ($p = 0.222$). This is attributable to the homogeneity of traditional fishing gear and boats utilized, whereby adding asset magnitude does not automatically increase catches when environmental carrying capacity is constrained. This finding contrasts with the view of Asrofiyah & Arka (2023), who stated that capital has a positive effect on income, but aligns with the condition described by Rahim et al. (2021), who asserted that the amount of capital among traditional fishermen has a less significant impact on income because a major portion

of daily capital is absorbed by operational consumption costs or bound to unfair informal financing systems.

Number of Trips (X_3): Does not have a statistically significant effect ($p = 0.816$). Increasing fishing frequency without certainty of fishing ground locations and proper seasonality risks triggering zero catch. This condition is highly relevant to the explanation provided by Aprianti et al. (2020), who stated that the fisheries sector exhibits high vulnerability to seasonal climate dynamics.

Operating Costs (X_5): Does not have a statistically significant effect ($p = 0.147$). Fuel and logistic expenditures constitute mandatory variable costs (unavoidable costs) that are relatively uniform across fishermen and remain adequately covered by production sales revenues.

CONCLUSION

This study demonstrates that, simultaneously, business capital, fish price, number of fishing trips, production volume, and operational costs significantly influence fishermen's income in Juru Banu Village, contributing 74.4 percent to the variance, while the remaining 25.6 percent is explained by other factors outside the model. Partially, fish selling price is proven to be the most dominant factor with a highly significant effect in determining fishermen's net income, followed by catch production volume, which also exerts a positive and significant effect on revenue enhancement. Conversely, business capital, number of fishing trips, and operational costs do not exhibit significant partial effects on income. This indicates that price stability for fishery commodities is the primary catalyst for improving the economic welfare of capture fishermen. The uniform nature of fishermen's routine equipment and operational expenses, alongside the ecological limits of swamp ecosystems, implies that increasing trip frequency or capital assets does not automatically yield

higher catches without assured aquatic resource availability

Declaration by Authors

Acknowledgement: None

Source of Funding: None

Conflict of Interest: No conflicts of interest declared.

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How to cite this article: Miranda Fitaloka, Leila Ariani Sofia, Idiannor Mahyudin. Determinants of fishermen's income in Juru Banu Village, Paju Epat District, East Barito Regency, Central Kalimantan. *International Journal of Research and Review*. 2026; 13(9): 161-165. DOI: <https://doi.org/10.52403/ijrr.20260918>
