Factors Affecting the Income of Capture Fishermen in Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency, West Sumatra

Faktor–Faktor yang Mempengaruhi Pendapatan Nelayan Tangkap di Kenagarian Tiku V Jorong Kecamatan Tanjung Mutiara Kabupaten Agam Provinsi Sumatera Barat

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Abstract

Tiku V Jorong is a marine coastal area where most of the population relies on the fisheries sector for their livelihood, particularly marine capture fisheries, which serve as their primary source of income. This research, conducted in February 2025, aims to analyze the factors influencing the income of shrimp capture fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency, West Sumatra Province. The research method used is a quantitative approach with a survey of 25 respondents who are shrimp capture fishermen using gillnet fishing gear. The data were analyzed using multiple linear regression to examine the effect of independent variables, namely, operational costs, work experience, and catch volume, on the dependent variable, which is fishermen's income. The results of this study show that all three variables significantly affect fishermen's income. Catch volume and work experience have a positive influence, while operational costs have a negative effect on income.

Keywords: Operational costs, Work experience, Catch volume

Abstrak

Tiku V Jorong adalah kawasan pesisir laut, di mana sebagian besar penduduknya bergantung pada sektor perikanan untuk mata pencaharian mereka, terutama pada perikanan tangkap laut, yang menjadi sumber pendapatan utama mereka. Penelitian ini dilakukan pada Februari 2025, bertujuan untuk menganalisis faktor-faktor yang memengaruhi pendapatan nelayan tangkap udang di Jorong Muaro Putuih Kenagarian Tiku V Jorong, Kecamatan Tanjung Mutiara, Kabupaten Agam, Provinsi Sumatera Barat. Metode penelitian yang digunakan dalam penelitian ini adalah metode kuantitatif dengan pendekatan survei kepada 25 responden nelayan tangkap udang yang menggunakan alat tangkap jaring. Data dianalisis menggunakan regresi linier berganda untuk menguji pengaruh variabel bebas yaitu biaya operasional, pengalaman kerja, dan hasil tangkapan terhadap variabel terikat (dependent) yaitu pendapatan nelayan. Hasil penelitian ini menunjukkan bahwa ketiga variabel tersebut berpengaruh signifikan terhadap pendapatan nelayan. Hasil tangkapan dan pengalaman kerja memiliki pengaruh positif, sedangkan biaya operasional menunjukkan pengaruh negatif terhadap pendapatan.

Kata kunci: Biaya operasional, Pengalaman kerja, Hasil tangkapan

1. Introduction

The welfare level of individuals engaged in fisheries (fishermen) remains lower than that of other economic sectors (Shafira, 2020). Coastal communities, in general, tend to occupy the lowest socioeconomic strata compared to inland populations. Capture fisheries play a crucial role in supporting food security in Agam Regency, West Sumatra Province, particularly by ensuring a consistent supply of fish. Although the annual production of capture fisheries in Agam Regency has steadily increased, the growth has not been substantial due to the limited range of fishing activities. This limitation is primarily attributed to inadequate fishing infrastructure and equipment, as well as the adverse impacts of extreme weather and climate conditions experienced in recent years.

Tiku V Jorong is a marine coastal area where most of the population relies on the fisheries sector for their livelihood, particularly marine capture fisheries, which serve as their primary source of income. However, household incomes among fishermen in Kenagarian Tiku V Jorong vary significantly. Some families earn low incomes, while others fall into moderate or high-income categories. Many fishing households continue to earn below-subsistence incomes, making it difficult to meet their basic daily needs (Arif, 2018). Given that Kenagarian Tiku V Jorong in Tanjung Mutiara, West Sumatra, is a region highly dependent on fisheries activities, it is essential to understand the various factors influencing fishermen's income in this area.

Fishermen's income is affected by a wide range of factors, including social, economic, and environmental conditions. These factors may exert direct and indirect effects on fish catch volume and, consequently, on the overall welfare of fishermen. One of the critical determinants of fishermen's income is access to fishing technology. However, such access is not uniformly distributed among fishermen, as it often depends on financial capital and the availability of knowledge. Weather conditions and climate variability also significantly impact fishing outcomes. In addition, social factors such as educational attainment and work experience play a pivotal role in enhancing fishermen's income. Economic elements, including fish market prices, are also vital determinants of income levels.

In the context of Kenagarian Tiku V Jorong, a comprehensive understanding of these influencing factors is essential for developing effective strategies to improve fishermen's income. Such an understanding provides a holistic perspective on the variables that affect the earnings of capture fishermen in the region.

2. Material and Method

2.1. Time and Place

This research was conducted in February 2025, located in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency, West Sumatra Province. The research site was purposively selected because Jorong Muaro Putuih is one of the fishing settlements where shrimp capture fishermen are actively engaged in marine fishing activities in Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency.

2.2. Methods

According to John W. Best, as cited in Hardani (2020), survey research is essentially a cross-sectional method. A cross-sectional method refers to the measurement of both independent and dependent variables conducted once and at the same point in time. This study aims to assess the factors influencing the income of shrimp capture fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency, West Sumatra Province.

2.3. Data Analysis
2.3.1. Income Analysis

To calculate the income of shrimp capture fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency, the income theory is applied. Income theory is used to determine the amount of a fisherman's income, which is the difference between total revenue (TR) and total cost (TC), using the following formula:

$$I = TR - TC$$

Where:
- I   : Income of Shrimp Capture Fishermen
- TR   : Total Revenue
- TC   : Total Cost

Total revenue (TR) is calculated by multiplying the quantity of production (Y), i.e., the fishermen's catch, by the selling price (Py) of the catch. The formula is as follows:

$$TR = Y \times Py$$

Where:
- TR   : Total Revenue

Y   : Quantity of Fish Catch
Py   : Selling Price of the Catch

Meanwhile, total fishing business costs (TC) are generally classified into two categories: fixed costs (FC) and variable costs (VC), as expressed in the following formula:
$$TC = FC + VC$$
Where:
TC   : Total Cost
FC   : Fixed Cost
VC   : Variable Cost

2.3.2. Analysis of Factors Affecting the Income of Capture Fishermen

According to Gujarati, as cited in Misda (2020), multiple linear regression analysis is used to examine the influence of independent variables on a dependent variable and to measure the extent of their effect. The multiple regression model used in this study is formulated as follows:
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$
Where:

Y	= Fishermen's Income	X_2	= Fishing Experience
β_0	= Intercept (constant term)	X_3	= Total Catch
$\beta_1, \ldots, \beta_3$	= Regression coefficients	e	= Error term
X_1	= Operational Costs		

After obtaining the regression results, classical assumption tests are carried out to ensure the validity of the model. These include the normality test, heteroscedasticity test, and multicollinearity test. Additionally, a goodness-of-fit assessment is performed through the coefficient of determination (R^2), the F-test, and the t-test to evaluate the explanatory power and significance of the model and its variables.

2.3.3. Classical Assumption Test

This test is conducted to ensure that the processed data is valid—free from statistical violations—and follows a normal distribution. The classical assumption test is therefore essential in confirming the reliability of the regression results. According to Supriana, as cited in Shafira (2020), classical assumption testing is a statistical prerequisite for multiple linear regression analysis based on the Ordinary Least Squares (OLS) method.

The classical assumption tests include: Normality Test: To verify that the residuals of the regression model are normally distributed; Heteroscedasticity Test: To detect any variance inconsistency in the residuals across observations; Multicollinearity Test: To identify whether there is a high correlation among independent variables, which could distort regression estimates.

2.3.4. Model Fit Test (Test of Goodness of Fit)

After conducting classical assumption tests to ensure that the specified linear regression model for fishermen's income satisfies the required statistical conditions, the next step is to assess the goodness of fit of the model. This is conducted using the coefficient of determination (R^2), the F-test, and the t-test. Coefficient of Determination (R^2): This statistic measures the proportion of the variance in the dependent variable (fishermen's income) that is explained by the independent variables in the model. An R^2 value closer to 1 indicates a better fit, meaning the model describes a large portion of the variation in the dependent variable. F-test: This test evaluates the overall significance of the regression model. It examines whether all the independent variables, taken together, have a statistically significant relationship with the dependent variable. A significant F-value indicates that the model provides a better fit than a model with no predictors.

T-test: This test assesses the significance of each independent variable. It determines whether each predictor has a statistically significant effect on the dependent variable. A significant t-value for a variable suggests that the variable meaningfully contributes to explaining fishermen's income. Together, these tests validate the explanatory power and statistical reliability of the model, ensuring that it can be appropriately used for inference and policy recommendations

3. Result and Discussion

3.1. Overview of Traditional Shrimp Fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong

Jorong Muaro Putuih, located in Kenagarian Tiku V Jorong, is a coastal area known as a center for traditional shrimp fishing activities. Fishermen in this area typically go to sea using small boats (sampan) or outboard motorboats, either self-made or inherited through generations. The primary fishing gear is the gill net, which is set in shallow waters near river estuaries or along the coastline.

Shrimp fishing activities are carried out daily, usually starting in the morning and ending in the late afternoon, depending on weather conditions, tidal patterns, and the expected catch. On Fridays, fishing is strictly prohibited out of respect for religious practices, and violating this customary rule may result in social sanctions from the local community. The shrimp catch obtained by shrimp fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, highly fluctuates and depends on seasonal variations and marine environmental conditions. During the west season or periods of high waves, shrimp catches can decline drastically due to the difficulties fishermen face when going out to sea and the migration of shrimp to deeper waters. Ocean currents also affect shrimp distribution, forcing fishermen to change locations frequently in search of optimal shrimp fishing grounds.

3.2. Catch Results of Fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong

The catch results of fishermen are influenced by their fishing experience. Like any profession that requires experience, fishermen need time, proper equipment, suitable bait, and knowledge of optimal fishing locations to catch fish effectively. The longer the experience, the more sensitive fishermen become to the positions of fish, which facilitates easier and more successful catches at sea (Uada et al., 2022). In Kenagarian Tiku, the highest production catch is shrimp, with fishermen catching between 144 kg and 600 kg /month.

3.3. Cost Incurred by Fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong

Costs refer to the expenditures invested throughout the operation of a business, calculated as the sum of total fixed costs (TFC) and total variable costs (TVC) (Soekartawi, as cited in Kamaruddin et al., 2025). Fixed costs in fishing operations refer to maintenance expenses that remain relatively constant and are incurred as long as fishing equipment and infrastructure reach their economic lifespan or suffer damage. These include fleet maintenance costs, fishing gear depreciation, and others. The main fixed cost for shrimp fishermen in Jorong Muaro Putuih is fishing gear maintenance. Most fishermen allocate around IDR125,000 per month for routine upkeep to keep their gear in good condition. Meanwhile, costs for purchasing or replacing fishing tools such as nets vary more widely, starting from IDR750,000. These fixed costs are essential to ensure fishing equipment remains functional and effective during fishing activities.

Variable costs refer to expenses for supplies and accommodation during fishing activities, including consumption costs (food and beverages) and fuel costs. Monthly fuel costs are higher than supply costs, with the latter ranging from IDR 1,200,000 to IDR 3,600,000. This variation reflects differences in fishing duration or distance traveled, with some fishermen requiring more fuel. Meanwhile, food and beverage costs average around Rp600,000 monthly and are more stable. These costs represent basic needs during an extended time at sea. Variable costs contribute significantly to total operational expenses and can affect fishermen's net income.

3.4. Income Analysis of Fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong

Income is defined as the difference between revenue and total production costs. Revenue is calculated by multiplying the total fish production by the selling price. The income of shrimp fishermen in Jorong Muaro Putuih shows considerable variation among individuals, depending on their catch volume and operational costs. Fishermen's net income (PD), calculated as the difference between total revenue (TR) and total cost (TC), ranges from IDR 374,000 to 9,950,000 per month. The highest income was earned by respondent 7, with revenue of IDR14,400,000 and costs of IDR 4,450,000, resulting in a net income of IDR 9,950,000. Conversely, respondent 4 recorded the lowest net income of IDR 374,000 due to low catch volume and relatively high operational costs.

This variation relates to shrimp catch amounts, influenced by fishermen's technical skills, fishing gear, and seasonal conditions. During peak seasons, catches increase, boosting income, while harsh weather reduces catches and income. Thus, catch volume is crucial to fishermen's income and economic welfare in Jorong Muaro Putuih. The average monthly net income ranges between IDR 2,900,000 and IDR 4,000,000, indicating that most fishermen earn profits, although some earn less. Efficient cost management, particularly of variable costs such as fuel, food, and adequate fishing equipment, strongly affects net earnings.

3.5. Analysis of Factors Affecting the Income of Capture Fishermen in Jorong Muaro Putuih

Normality testing was performed using the One-Sample Kolmogorov-Smirnov method. The decision criterion is based on the significance value (Sig.): if Sig. < 0.05, the data are not normally distributed; conversely, if Sig. $>$ 0.05, the data are normally distributed (Dimas & Sutrisna, 2018).

Table 3. Normality Test Results

Kolmogorov-Smirnov	Asympg. Sig	Criteria	Conclusion
0,977	0,200	> 0,05	Normally distributed

The Kolmogorov-Smirnov test result shows an Asymp. Sig. Value of 0.200, which is greater than 0.05. This indicates that the data are normally distributed and meet the assumptions for regression analysis. This test aims to

determine whether the independent variables (Operational Costs, Experience, and Catch/Production) exhibit multicollinearity within the regression model.

Table 4. Multicollinearity Test Results

Variable	Tolerance	VIF	Description
Operational Costs	0.843	1.583	No multicollinearity
Experience	0.861	1.037	No multicollinearity
Production	0.946	1.625	No multicollinearity

All independent variables show Tolerance values greater than 0.10 and VIF values below 10, indicating that the regression model is free from multicollinearity issues. The Heteroskedasticity Test aims to determine whether the variance of residuals in the regression model is constant (homoskedastic) or varies (heteroskedastic). The test was conducted on the variables of operational costs, experience, and production by examining the significance (Sig.) values of each variable.

Table 5. Heteroskedasticity Test Results

Variable	Sig. Value	Description
Operational Costs	.344	No heteroskedasticity
Experience	.634	No heteroskedasticity
Production	.018	Heteroskedasticity present

Based on the results, operational costs and experience variables show no indication of heteroskedasticity (Sig. > 0.05), whereas the production variable indicates the presence of heteroskedasticity (Sig. < 0.05). The partial test (t-test) is used to assess the individual significance of each independent variable on the dependent variable. In this study, the independent variables tested include operational costs, fishing experience, and production (catch volume), with fishermen's income as the dependent variable.

Table 6. T-Test (Partial Test) Results

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-294451.927	965190.327		-.305	.763
Operational Costs	-1.276	.206	-.612	-6.199	.000
Experience	1165.342	48669.803	.002	.024	.981
Production	24687.860	2124.829	1.162	11.619	.000

The F-test is used to determine the overall significance of the regression model, specifically, whether the independent variables (operational costs, catch production, and work experience) collectively have a significant effect on the dependent variable (fishermen's income).

Table 7. F-Test results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	119334726983743.020	3	39778242327914.336	47.112	.000[b]
	Residual	17731190456256.980	21	844342402678.904		
	Total	137065917440000.000	24			

The coefficient of determination (R^2) indicates the proportion of variance in the dependent variable (fishermen's income) that can be explained collectively by the independent variables—operational costs, work experience, and catch production—in the regression model.

Table 8. R² test results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.933[a]	.871	.852	918881.060

Regression analysis shows operational costs significantly affect fishermen's income in Jorong Muaro Putuih. The t-value (–6.1999) exceeds the t-table value (1.717), indicating a significant negative effect. This means that an increase in operational costs leads to a decrease in fishermen's income. This finding aligns with Sabu & Sofyan (2022); Manzi et al. (2025), who reported a significant negative impact of operational costs on fishermen's income.

Work experience has a positive but not statistically significant effect on income. The t-value (0.024) is less than the t-table value (1.717), and the significance value (0.981) exceeds 0.1, indicating no significant influence. This supports Aryanto (2017), who found that while experience positively affects income, it is insignificant, and other factors, such as working capital, have a more substantial impact. The catch results are not always determined by fishing experience alone.

Catch results significantly positively affect fishermen's income, with a t-value of 11.619 > 1.717 and a significance of 0.000 < 0.1. Simultaneous regression shows that operational costs, work experience, and catch results jointly significantly affect fishermen's income (F = 47.112 > F-table 3.049; significance = 0.000 < 0.05). The coefficient of determination (R²) is 0.871, indicating that these variables explain 87.1% of income variance, while other factors outside this study influence 12.9%.

4. Conclusions

This study examined factors influencing the income of capture fishermen in Jorong Muaro Putuih, Kenagarian Tiku V Jorong, Tanjung Mutiara District, Agam Regency. The results showed that fishermen's net income varied widely, ranging from IDR 374,000 to IDR 9,950,000 per month, with 60% earning a moderate income between IDR 1,000,000 and IDR 5,000,000. On average, monthly net income ranged from IDR 2,900,000 to IDR 4,000,000. Operational costs, work experience, and catch yield collectively significantly impacted income, explaining 87.1% of its variation (R² = 0.871). Individually, operational costs had a significant negative effect, indicating that higher expenses reduce fishermen's income. Catch yield positively and significantly influenced income, meaning larger shrimp catches increased earnings. Meanwhile, work experience showed no significant effect, suggesting that longer fishing experience does not statistically translate to higher income.

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