

Analysis Of Factors Affecting The Price Of Skipjack Tuna (Katsuwonus Pelamis) At The Fishermen Level At The Sodohoa Fish Auction Market (PPI) In Kendari City

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Abstract

This study aims to analyze the factors influencing the price of skipjack tuna (*Katsuwonus pelamis*) and to identify the most dominant factor. The study was conducted at the Sodohoa Fishery Port in Kendari City with a population of 196 fishermen and a sample of 66 respondents, determined using the Slovin formula with a 10% margin of error. Data analysis employed multiple linear regression using a log-linear model via natural logarithmic (Ln) transformation. The results indicate that production volume (X_1), operating costs (X_2), and weather conditions (X_3) have a significant effect on skipjack tuna prices (Y). The production volume coefficient of -0.579 indicates that a 1% increase in production volume will decrease the price by 0.579%, while the operational cost coefficient of 0.023 indicates that a 1% increase in operational costs will increase the price of skipjack tuna (Y) by 0.023%. The weather coefficient of -0.1210.679 indicates that good weather tends to lower prices compared to bad weather. The R^2 value of 0.650 indicates that 65% of the variation in price is explained by the three variables, while 35% is influenced by other variables outside the model. Operating costs are the most dominant factor influencing skipjack tuna prices

Keyword: skipjack tuna prices, production volume, operating costs, weather factors, log-linear regression.

INTRODUCTION

Indonesia is an archipelagic and maritime nation with vast fisheries resources. Its vast maritime territory and long coastline mean that the capture fisheries sector plays a vital role in

food security, as a source of income for coastal communities, and in the trade of fishery products. As fisheries resources are considered *common goods* and *open access*, they allow for the widespread use of marine biological resources by the public. This potential indicates that Indonesia's fishery resources offer great opportunities for development as economic commodities and for international trade (Wulandari et al., 2025). One important commodity is skipjack tuna (*Katsuwonus pelamis*), a large pelagic fish with oceanic characteristics that migrates in response to oceanographic, biological, and meteorological conditions suited to its habitat (Syakib and Handiani, 2023). Skipjack tuna fishing grounds include WPP-NRI 714, which covers the Maluku Sea, the Seram Sea, the Banda Sea, the Flores Sea, and the Makassar Strait (Zainuddin et al., 2017; Rubianti, 2023).

The Southeast Sulawesi Province is a key region for capture fisheries due to its strategic location bordering WPP-NRI 713 and WPP-NRI 714. Additionally, this region is part of Corridor I of the National Fish Logistics System, thereby playing a role in the distribution of fishery products (Baskoro et al., 2020). The city of Kendari serves as a center for capture fisheries activities, with the Sodohoa Fishery Port (PPI Sodohoa) functioning as a landing and marketing site for fishermen's catches. Skipjack tuna is a key commodity in these activities. However, this potential is subject to production and price dynamics that tend to fluctuate. This situation warrants close attention because changes in production and prices are directly linked to fishermen's income and economic standing.

Table 1. Weighted Average Production and Prices of Skipjack Tuna in Kendari City

Year	Production (Metric Tons)	Weighted Average Price (Rp/kg)
2020	6,972.44	14,027
2021	3,618.62	17,475
2022	7,114.18	16,471
2023	5,649.69	17,098
2024	4,614.49	15,519

Source: Ministry of Marine Affairs and Fisheries (KKP), *Capture Fisheries Statistics for Southeast Sulawesi* (2025).

The data shows that skipjack tuna production in Kendari City fluctuated during the 2020–2024 period. The highest production occurred in 2022 at 7,114.18 metric tons, while the lowest production occurred in 2021 at 3,618.62 metric tons. While production declined in 2021, prices actually rose from Rp14,027/kg in 2020 to Rp17,475/kg. Conversely, when production increased



in 2022, prices fell to Rp16,471/kg. These conditions indicate a tendency for a relationship between supply and price formation, although price changes are not entirely determined by production. Price fluctuations can also be influenced by weather conditions, fishing seasons, operational costs, and marketing mechanisms. Aufania et al. (2023) explain that information constraints mean prices at the fisher level are not always able to keep pace with changes in consumer-level prices quickly and proportionally. Meanwhile, weather conditions and increases in fuel prices can hinder fishing activities and limit fish supply, thereby affecting market prices (Ningsih and Suyuti, 2024).

Several studies have examined factors related to prices and the economic conditions of skipjack tuna fishermen, though with varying focuses. Rahim et al. (2024) found that fluctuations in skipjack tuna prices are influenced by the season, supply shortages, and weather conditions, and highlighted weak long-term market integration, causing fishermen to tend to act as *price takers*. Yapanto et al. (2021) demonstrated that the length of the marketing channel can reduce marketing efficiency and decrease the share of profits received by fishermen. From a production perspective, Klara et al. (2019) found that fishermen's income is influenced by catch volume, work experience, and the type of fishing gear used. Meanwhile, Ramadan et al. (2024) show that demand for skipjack tuna is more strongly influenced by consumer income, the prices of complementary goods, and the number of family dependents, whereas Oskarino and Trisbiantoro (2025) find that skipjack tuna prices affect both demand and supply. These differing findings indicate that the price dynamics and market conditions for skipjack tuna can be influenced by regional characteristics and the socioeconomic conditions of the community.

In addition to production and market factors, operational costs and weather also play a role in determining fishermen's economic conditions. Lasut et al. (2019) showed that increases in fuel prices and changes in weather conditions lead to a decline in fishermen's income. These findings are supported by Raju et al. (2022), who demonstrated that labor and fuel costs are key components of fishing operations and are closely linked to the economic performance of the fishing industry. When operational costs rise, the expenses fishermen must incur to obtain their catch increase. On the other hand, adverse weather can reduce fishing intensity, thereby lowering production volume. Thus, changes in production, operational costs, and weather conditions are interrelated and can influence fish availability and price formation at the fishermen's level.

Based on previous research, studies on skipjack tuna have tended to address production factors, marketing, demand, operating costs, or weather conditions in isolation. Few studies have integrated production volume, operating costs, and weather conditions into a single





analytical framework to explain fluctuations in skipjack tuna prices at the local level, particularly in Kendari City. This situation represents a *research gap* that needs to be addressed because these three factors are interrelated in shaping supply and price conditions. Therefore, this study aims to analyze the factors influencing skipjack tuna prices at the Sodohoa Fishery Port (PPI) in Kendari City by incorporating production volume, operating costs, and weather conditions as the main variables. The novelty of this study lies in the integration of these three factors to analyze price formation at the local level based on the conditions of fishermen in Kendari City. The results are expected to provide empirical evidence regarding the factors influencing skipjack tuna prices and to serve as a basis for formulating policies on price stabilization, operational cost efficiency, and adaptive management of capture fisheries in response to weather conditions.

METHOD

This study was conducted at the Sodohoa Fish Auction Market (PPI), Kendari City, Southeast Sulawesi Province, from February to May 2026. The research location was selected *purposively*, considering that the Sodohoa Fish Auction Market is one of the centers of capture fisheries activity and skipjack tuna landings in Kendari City and exhibits fluctuating price dynamics. The study used a quantitative approach to analyze the factors influencing skipjack tuna prices at the fisherman level.

The study population consisted of all fishermen actively catching and selling skipjack tuna at the Sodohoa Fishery Port (PPI Sodohoa). Based on data from the Sodohoa Subdistrict Office, there were 196 active fishermen. The sample was determined using the Slovin formula with a 10% margin of error, resulting in 66 respondents. Respondents were selected based on the criterion of being fishermen actively engaged in catching and selling skipjack tuna at the Sodohoa Fishery Port (PPI Sodohoa).

The data used consisted of primary and secondary data. Primary data were obtained through structured interviews using a questionnaire administered to the 66 respondents, covering skipjack tuna prices, catch volumes, operational costs, and weather conditions during fishing activities. Secondary data were obtained from the Kendari City Marine and Fisheries Office, the Central Statistics Agency, the Sodohoa Village Office, the Ministry of Marine Affairs and Fisheries, as well as various relevant literature and previous studies.

Data collection was conducted through observation, structured interviews, and documentation. Observations were conducted to obtain an overview of skipjack tuna fishing, landing, and marketing activities at the Sodohoa Fishing Port (PPI Sodohoa). Interviews were conducted in person using a questionnaire designed based on the research variables, while



documentation was used to supplement the primary data with production data, prices, and other supporting information. The analysis method used was quantitative analysis employing a multiple linear regression approach, supported by classical assumption tests and inferential statistics

RESULTS AND DISCUSSION

Classical Assumption Tests

Classical assumption tests were conducted to ensure that the regression model met statistical requirements so that the estimation results could be used to explain the factors influencing skipjack tuna prices. The tests included normality, multicollinearity, and heteroscedasticity tests. According to Hutagaol (2025), classical assumption tests are necessary to ensure the validity of the regression model, while Ghozali (2021) explains that these tests are important for determining whether the assumptions in regression analysis are met. The results of the residual normality test using the Kolmogorov-Smirnov test are presented in Table 2.

Table 2. Normality Test Results

Description	Value
N	66
Asymp. Sig. (2-tailed)	0.200
Monte Carlo Sig. (2-tailed)	0.196
Lower Bound of 99% CI	0.186
Upper Bound of 99% CI	0.206

The Asymp. Sig. value is 0.200 and the Monte Carlo Sig. value is 0.196, both of which are greater than 0.05. These results indicate that the residuals in the model are normally distributed. Ghozali (2021) states that the residuals can be considered normally distributed if the significance value is greater than 0.05. Thus, the normality assumption in the research model has been met.

Next, a multicollinearity test was conducted to determine whether there was a strong linear relationship among the independent variables. The test results are presented in Table 3.

Table 3. Multicollinearity Test Results

Variable	Tolerance	VIF
LN_X1 Fish Production	0.990	1.010
LN_X2 Operating Costs	0.990	1.010

X3 Weather	1.000	1.000
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The test results show that all variables have tolerance values greater than 0.10 and VIF values less than 10. This means there is no evidence of multicollinearity in the regression model. According to Ghazali (2021), tolerance values >0.10 and VIF values <10 indicate that the model is free from multicollinearity. Gujarati and Porter (2009) also explain that the absence of high multicollinearity is necessary so that the effect of each independent variable on the dependent variable can be estimated more accurately. Thus, fish production, operating costs, and weather are suitable for use together in the model.

A heteroscedasticity test was conducted to determine whether there was unequal variance in the residuals of the regression model. The test used the Glejser method, with the results presented in Table 4.

Table 4. Heteroscedasticity Test Results

Variable	Sig.
LN_X1 Fish Production	0.906
LN_X2 Operating Costs	0.210
X3 Weather	0.724

The significance values are 0.906 for fish production, 0.210 for operating costs, and 0.724 for weather. All of these values are greater than 0.05, so it can be concluded that the model does not exhibit heteroscedasticity. These results are consistent with Ghazali's (2021) criteria, which state that a significance value >0.05 in the Glejser test indicates the absence of heteroscedasticity. Gujarati and Porter (2009) emphasize that a model with constant residual variance will yield more reliable estimates. Based on these three tests, the regression model satisfies the classical assumptions and can proceed to hypothesis testing.

The Effect of Fish Production, Operating Costs, and Weather on Skipjack Tuna Prices

A simultaneous test was conducted to determine whether fish production, operating costs, and weather collectively affect skipjack tuna prices. The results of the F-test are presented in Table 5.

Table 5. F-Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.013	3	0.004	38.410	0.000

Residual	0.007	62	0.000	–	–
Total	0.020	65	–	–	–

The calculated F-value of 38.410 with a significance level of $0.000 < 0.05$ indicates that fish production, operating costs, and weather simultaneously have a significant effect on skipjack tuna prices at the fisherman level at the Sodohoa Fishery Port (PPI) in Kendari City. According to Ghazali (2018), a significance level of less than 0.05 indicates that the independent variables collectively have a significant effect on the dependent variable. These results suggest that the pricing of skipjack tuna is the result of the interaction of several factors, particularly catch availability, fishing costs, and weather conditions. These findings are consistent with those of Kalfa, Arslan, and Ertuğrul (2021), who demonstrated that various factors related to production and economic conditions can collectively influence commodity price formation.

The model's ability to explain variations in skipjack tuna prices can be seen through the coefficient of determination values in Table 6.

Table 6. Coefficient of Determination

Model	R	R-Square	Adjusted R-Square	Std. Error of Estimate
1	0.806	0.650	0.633	0.01050

An R-value of 0.806 indicates a strong relationship between fish production, operating costs, and weather conditions and skipjack tuna prices. The R-Square value of 0.650 indicates that 65.0% of the variation in skipjack tuna prices can be explained by the three variables in the model, while the remaining 35.0% is explained by other factors not examined in this study. The Adjusted R-Square value of 0.633 reflects the model's explanatory power after being adjusted for the number of variables and sample size. Ghazali (2018) explains that the coefficient of determination is used to measure a model's ability to explain variation in the dependent variable. Thus, the research model has a fairly strong explanatory power regarding changes in skipjack tuna prices.

The partial effects of each variable were tested using the t-test. The test results are presented in Table 7.

Table 7. t-Test Results

Variable	B	Standard Error	Beta	t	Sig.
Constant	9.424	0.061	–	153.898	0.000
LN_X1 Fish Production	-0.579	0.006	-0.265	-2.523	0.014

LN_X2 Operating Costs	0.023	0.003	0.567	6.908	0.000
X3 Weather	-1,210.679	513.314	-0.247	-2.359	0.022

Based on Table 7, fish production has a coefficient of -0.579 with a significance value of $0.014 < 0.05$. This indicates that fish production has a negative and significant effect on skipjack tuna prices. A negative coefficient means that an increase in production or catch volume tends to cause a decrease in price, assuming all other variables remain constant. This relationship can be explained through the supply mechanism: when catch volume increases, the availability of fish in the market rises, causing prices to tend to fall if the increase in demand does not match the increase in supply. Conversely, limited catch volume can lead to reduced supply and rising prices. These results are consistent with Dueri et al. (2016), who demonstrated a relationship between catch volume and skipjack tuna prices, whereby an increase in catch volume can put downward pressure on prices.

Operating costs have a coefficient of 0.023 with a significance level of $0.000 < 0.05$. These results indicate that operating costs have a positive and significant effect on skipjack tuna prices. Increases in operating costs—such as fuel, ice, food, and supplies—raise the expenses fishermen must bear during fishing operations. These conditions drive the formation of higher selling prices so that revenue from the catch can cover operational costs and generate a profit for fishermen. In the log-log model, the coefficient of 0.023 indicates that a 1% increase in operational costs is associated with a price increase of approximately 0.023%, assuming all other variables remain constant.

The weather variable has a coefficient of -1,210.679 with a significance value of $0.022 < 0.05$. Thus, weather has a negative and significant effect on skipjack tuna prices. Since weather is a dummy variable, this coefficient reflects the price difference between the weather category assigned a value of 1 and the reference category assigned a value of 0. The negative effect indicates that the weather category with a value of 1 is associated with a lower price compared to the reference category, assuming all other variables remain constant. Economically, weather conditions that support fishing activities allow fishermen to operate more efficiently, thereby increasing fish supply and potentially lowering prices. Conversely, less favorable weather can hinder fishing activities and reduce supply, causing prices to tend to rise.

Overall, the t-test results show that all three independent variables have a significant partial effect on skipjack tuna prices. The differing directions of these effects indicate that each variable operates through distinct mechanisms. Production relates to the quantity of supply;

operating costs relate to the expenses fishermen must bear; and weather relates to fishermen's ability to engage in fishing activities and the availability of fish in the market.

The Most Dominant Factor Affecting Skipjack Tuna Prices

The dominant factor is determined based on the values of the Standardized Beta Coefficients. The test results are presented in Table 8.

Table 8. Standardized Beta Values of Independent Variables

Variable	Standardized Beta
Fish Production	-0.265
Operating Costs	0.567
Weather	-0.247

Based on Table 8, operating costs have the largest absolute value of the Standardized Beta coefficient—0.567—compared to fish production at 0.265 and weather at 0.247. Thus, operating costs are the most dominant factor influencing skipjack tuna prices at the fisherman level at the Sodohoa Fish Auction Market in Kendari City.

The dominance of operating costs indicates that the expenses incurred by fishermen during fishing activities are a critical consideration in price formation. Increases in the costs of fuel, ice, food, and other operational needs raise production costs, creating a need for fishermen to secure a selling price that can cover these expenses. Consequently, operating costs exert a relatively stronger influence than fish production and weather in the research model.

The use of the Standardized Beta as the basis for determining the dominant factor aligns with Mizumoto (2023), who explains that standardized coefficients can be used to compare the relative strength of each independent variable in the model. Therefore, a Beta value of 0.567 indicates that operational costs have the strongest relative influence—not that they account for 56.7% of the fish price.

Overall, the study shows that fish production, operating costs, and weather simultaneously have a significant effect on skipjack tuna prices. Partially, all three variables also have significant effects, with production and weather having negative effects, while operating costs have a positive effect. Of these three factors, operating costs are the most dominant factor influencing skipjack tuna prices at the PPI Sodohoa fishery in Kendari City.



CONCLUSION

The study shows that fish production, operating costs, and weather significantly influence skipjack tuna prices at the Sodohoa Fishery Port (PPI) in Kendari City. Production and weather have negative effects, while operating costs have a positive effect. Operating costs are the most dominant factor, with a Standardized Beta value of 0.567. Therefore, efficiency in fishing costs, the use of weather information, increased price transparency, and government support in providing market facilities and information are necessary to maintain business sustainability and the well-being of fishermen.

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