ANALISIS FAKTOR-FAKTOR YANG MEMPENGARUHI HARGA JUAL TUNA MATA BESAR BEKU (TUNNUS OBESUS) DI PELABUHAN PERIKANAN SAMUDERA CILACAP

ANALYSIS OF FACTORS AFFECTING THE SELLING PRICE OF FROZEN BIG EYE TUNA (TUNNUS OBESUS) AT CILACAP FISHING PORT

Shiffa Febyarandika Shalichaty[1], Suradi Wijaya Saputra[2], Dian Wijayanto[3], Bayu Surarso[4]

[1] Program Studi Doktor Manajemen Sumber Daya Periaran, Universitas Diponegoro, Semarang
[2] Program Studi Manajemen Sumber Daya Perairan, Universitas Diponegoro, Semarang
[3] Program Studi Perikanan Tangkap, Universitas Diponegoro, Semarang
[4] Program Studi Matematika, Universitas Diponegoro, Semarang

ABSTRAK. Tuna mata besar merupakan salah satu komoditas perikanan utama Indonesia. Salah satu lokasi utama pendaratan dan penanganan rutin spesies ini adalah Pelabuhan Perikanan Cilacap. Harga jual tuna mata besar memainkan peran penting dalam keberlanjutan bisnis perikanan. Namun, harga tuna yang tidak stabil dan sulit diprediksi menyulitkan beberapa bisnis untuk menilai keberlanjutan jangka panjang mereka. Berbagai faktor memengaruhi harga tuna, baik faktor internal dalam operasi perikanan maupun kondisi ekonomi eksternal. Studi ini bertujuan untuk mengidentifikasi faktor-faktor yang memengaruhi harga jual tuna mata besar beku di Pelabuhan Perikanan Cilacap. Studi ini menggunakan observasi langsung, wawancara, dan tinjauan pustaka, dengan data dari tahun 2022 hingga 2024. Metode yang digunakan adalah analisis regresi linier berganda. Hasil penelitian menunjukkan bahwa harga jual tuna mata besar beku dipengaruhi oleh volume produksi, nilai produksi, bulan penangkapan ikan, dan biaya operasional. Hasil uji F menunjukkan bahwa nilai tukar dolar, volume dan nilai ekspor, volume produksi, nilai produksi, bulan penangkapan ikan, dan biaya operasional secara simultan memengaruhi harga jual tuna mata besar. Variabel-variabel ini memengaruhi 80,6% harga jual tuna mata besar, sedangkan 19,4% dipengaruhi oleh faktor-faktor lain di luar penelitian.

ABSTRACT. *Bigeye tuna is one of Indonesia's leading fishery commodities. One of the main locations for the routine landing and handling of this species is the Cilacap Fishing Port. The selling price of bigeye tuna plays a crucial role in the sustainability of fisheries businesses. However, unstable and unpredictable tuna prices make it difficult for some businesses to assess their long-term sustainability. Various factors influence tuna prices, both internal to fishing operations and external economic conditions. This study aims to identify factors that influence the selling price of bigeye tuna at the Cilacap Fishing Port. This study used direct observation, interviews, and a literature review, with data ranging from 2022 to 2024. The analytical approach used was multiple linear regression analysis. The research findings indicate that the selling price of frozen bigeye tuna is influenced by production volume, production value, fishing month, and operational costs. The F-test results indicate that the dollar exchange rate, export volume and value, production volume, production value, fishing month, and operational costs simultaneously influence the selling price of bigeye tuna. These variables influence 80.6% of the selling price of bigeye tuna, while 19.4% is influenced by other factors outside the research.*

INTRODUCTION

Tuna is one of Indonesia's leading commodities, both in terms of production, exports, and economic value. Tuna fisheries in several Indonesian provinces are among the 10 commodities with the highest export value (Ministry of Trade of the Republic of Indonesia,

2024). Tuna is a key export commodity in Indonesia. Its fishing grounds stretch from western to eastern Indonesia (Firdaus, 2018). Tuna species that are often found in Indonesian waters include albacore tuna (*Thunnus alalunga*), yellowfin tuna (*Thunnus albacares*), skipjack tuna/skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*Thunnus obesus*), bluefin tuna (*Thunnus thynnus*), Southern bluefin tuna (*Thunnus maccoyii*).

The potential of bigeye tuna in terms of Maximum Sustainable Production (MSY) is estimated at 87,000 tons per year. Total production across all IOTC member countries in 2018 was 93,515 tons, and the average production (2014-2018) was 92,140 tons (Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia, 2021). Bigeye tuna fishing grounds in Indonesia include the Indian Ocean, Banda Sea, Flores Sea, Maluku Sea, Halmahera Sea. Papuan waters, North Sulawesi waters and South Sulawesi. Cilacap fishing port is one of the largest ports for landing bigeye tuna caught from fishing grounds in the southern waters of Java. The southern waters of Java are one of the largest bigeye tuna fishing grounds in Indonesia, with demand continuing to increase (Az Zahra *et al*, 2023). Bigeye tuna landed at Cilacap fishing port has a production value of 8.2 billion rupiah, with an average price per kilogram of around 9,300 rupiah. Bigeye tuna is one of Indonesia's leading export products. Indonesian bigeye tuna is exported to global markets such as the United States, Japan, the European Union, Southeast Asia, and the Middle East (Cilacap Regency Central Statistics Agency, 2022).

Table 1. Volume and production value of bigeye tuna in Indonesia (2019-2023)

Year	Volume (ton)	Production value (Trillion Rupiah)
2019	68.202	2.991
2020	63.538	2.415
2021	49.557	1.967
2022	95.647	3.789
2023	63.554	1.968

Bigeye tuna products are exported in various forms, namely fresh tuna exported to Japan, the United States, the European Union, frozen tuna exported to Japan, Korea, the United States and Spain, tuna loin consisting of fresh loin, frozen loin or cooked loin and canned tuna in the form of chunks in oil/water, solid packs, and flakes, tuna steak, tuna pockets, sashimi. These processed bigeye tuna products are developing frequently with the development of fishing and fish processing technology and large market interest. These processed tuna products are also an

alternative to the availability of tuna products along with the limitation of the number tuna catches for the sustainability of natural resources. Continuous fresh or frozen processed products will make tuna fishing efforts also increase therefore with various processed tuna products in the form of cans or other processed products as a long-term alternative to tuna products in the market because canned tuna or processed tuna has a longer shelf life compared to tuna.
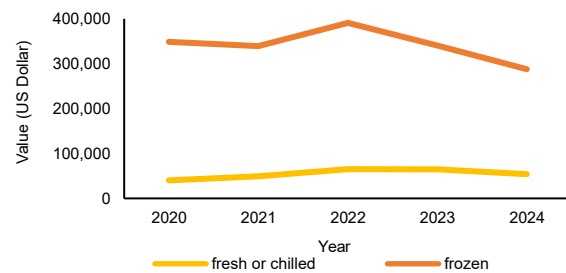

Figure 1. World export data for fresh frozen tuna eye products and frozen big eye tuna (www.trademap.com)
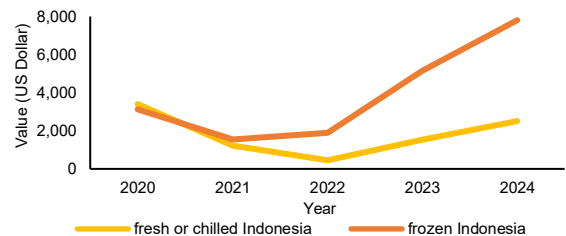

Figure 2. Export data for fresh frozen tuna and frozen bigeye tuna products from Indonesia (www.trademap.com)

The price of bigeye tuna fluctuates, influenced by several factors: variations in supply and demand, seasonal factors, and weather conditions. The influence of quota policies and regulations, and currency exchange rates. Variations in market supply and supply conditions create significant price differences. If raw material supplies are abundant, prices tend to decrease, and if raw material supplies are scarce, prices tend to increase. Seasonal and weather influences also contribute to price differences. Inclement weather causes fishermen to avoid going to sea, reducing raw material supplies, leading to product shortages and high selling prices. Fishing quota policies also influence selling prices. Indonesia has a bigeye tuna catch quota of 18,605 tons in 2024, and in 2025, the quota will increase to 21,396 tons. The US dollar exchange rate also influences tuna prices, particularly in the export market. When the

Rupiah weakens, domestic prices can increase, and vice versa.

The tuna quota restriction certainly has an impact on the sustainability of the tuna fishing business in Indonesia. The decreasing amount of Indonesian tuna quota will also reduce tuna fishing efforts, and vice versa, the greater the amount of tuna quota obtained by Indonesia, the greater the fishing efforts will be. The influence of the amount of quota obtained by Indonesia has an impact on the size of the income obtained by tuna fishing business actors, one of which is related to the selling price of tuna. Fluctuating selling prices have caused tuna businesses to experience a decline in terms of income obtained from the selling price of tuna. Tuna production and prices in Indonesia are influenced by several factors, namely the number of tuna fishing fleets in Indonesia, tuna fishing seasons, tuna types, tuna quality, tuna prices, and the rupiah exchange rate against the dollar. The rupiah exchange rate has a significant value on the value of tuna exports. The movement of Indonesian tuna export volume is determined by the high and low exchange rates that apply during international trade. An increase in the exchange rate against the dollar can increase the volume of tuna exports (Rifaldi *et al*, 2020).

The purpose of this study was to determine the variables that influence the selling price of frozen tuna at the Cilacap fishing port. The independent variables used in this study were the rupiah exchange rate against the dollar, the number of bigeye tuna exports, the value of bigeye tuna exports, the number of bigeye tuna production, the value of bigeye tuna production, the month of fishing, and the operational costs of bigeye tuna fishing. This study also aimed to determine the extent of the influence of these independent variables on the selling price of bigeye tuna at the Cilacap fishing port.

MATERIALS AND METHODS

This research was conducted at the Cilacap fishing port in 2024, using primary and secondary data. The primary data collected included selling prices, production volume, fishing production costs, and the types of fishing gear used to catch bigeye tuna. Primary data were obtained from interviews with 30 longline fishermen and 30 handline fishermen. Interviews were conducted using a questionnaire to determine operational costs in fishing, the amount of catch, and the fishing season for bigeye tuna. The fishermen who became respondents in this study were fishermen who regularly load and unload their catch at the Cilacap fishing port and had been operating for at least 5 years. Secondary data used in this study included export volume, export value, and the rupiah exchange rate against the dollar. Secondary data were obtained from data from the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia and data from trade map. Data on the rupiah exchange rate against the dollar was obtained from Bank Indonesia data. Data were collected from 2022 to 2024.

Tuna is multiple linear regression analysis, t test and f test. The analysis used to determine how much influence these factors have on the selling price is by using determination analysis. The regression equation in this study is

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7$$

The analysis was carried out using SPSS software, where the variables are the selling price of bigeye tuna (Y), the dollar exchange rate (x1), the quantity of bigeye tuna exports (kg) (x2), the export value of bigeye tuna (x3), the quantity of bigeye tuna production (x4), the production value of bigeye tuna (x5), the month of fishing (x6) and the operational costs of catching bigeye tuna (x7). The selling price of bigeye tuna is stated in rupiah, the rupiah exchange rate against the dollar is stated in rupiah, the quantity of bigeye tuna exports is stated in kg/month, the export value of bigeye tuna is stated in rupiah/month, the quantity of bigeye tuna production is stated in kg/month, the production value of bigeye tuna is stated in rupiah/month, the fishing month is stated in numbers 1-12 and the operational costs of fishing for bigeye tuna are stated in rupiah/month from all vessels that land bigeye tuna catches at the port of Cilacap every month.

Normality, homoscedasticity, variance inflation factor (VIF), and independence analysis have been conducted. The normality results show that the histogram in the P-Plot follows a straight line, the homoscedasticity results form randomly distributed points, and the independence of the variables shows a value of 2.215, indicating no auto colinearity. The VIF results from x1 to x7 show a value less than 10, indicating no multicollinearity problem.
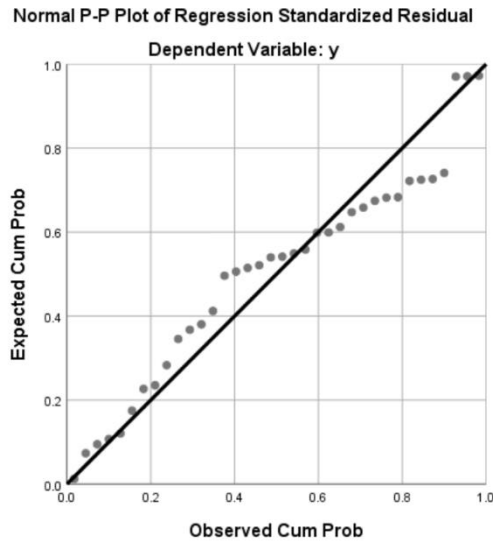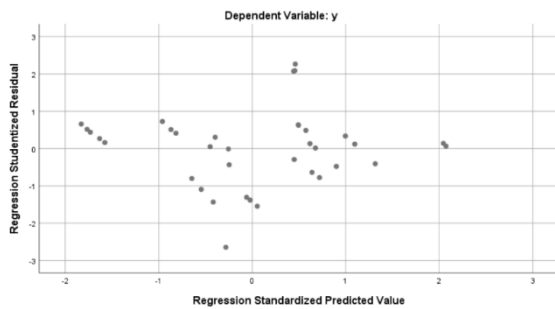
Figure 3. Normality Test Results

Figure 4. Homoscedasticity Test Results

Table 2. Variance Inflation Factor (VIF) Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	x1	.863	1.158
	x2	.176	5.697
	x3	.185	5.399
	x4	.177	5.647
	x5	.192	5.213
	x6	.857	1.167
	x7	.449	2.229
a. Dependent Variable: y			

RESULTS AND DISCUSSION

Analysis to determine the relationship between each independent variable to the dependent variable using the T test. The variables used in this study consist of 7 independent variables and 1 dependent variable. The dependent variable in this study is the selling price

of bigeye tuna, and 7 independent variables are the selling price of bigeye tuna, the dollar exchange rate, the number of bigeye tuna exports, the value of bigeye tuna exports, the number of bigeye tuna production, the value of bigeye tuna production, the month of capture and the operational costs of catching bigeye tuna. The number of data used in this study is 36 data from 2022-2024. The following are the results of the t-test using SPSS software.

Figure 5. T-Test Results

The t-test results show that the dollar exchange rate has a significant value of 0.732, the number of tuna exports has a significant value of 0.424, the export value of bigeye tuna has a significant value of 0.41, the amount of tuna production, the value of tuna production and the month of fishing have a significant value of 0 and the operational cost of tuna fishing has a significant value of 0.044. The independent variable is declared to have an effect on the dependent variable if the significance value has a value of less than 0.05, if the significance value is greater than 0.05 then the independent variable does not affect the dependent variable. The SPSS results show that the independent variables that have a value of less than 0.05 are the variables of the amount of production, production value, month of fishing and operational costs of tuna fishing. While the dollar exchange rate, the number of exports and the value of exports do not have a significant effect on the selling price of bigeye tuna because they have a significance value of more than 0.05.

The results of the analysis are related to the research object, where the object of this research is the selling price of bigeye tuna at the Cilacap fishing port. The selling price of this research is taken from the selling price at the fisherman level, so that the results of the T test show that variables such as the amount of production at the Cilacap fishing port, the production value at the Cilacap fishing port, the month of tuna fishing and operational costs have a direct influence on the selling price of bigeye tuna at the fisherman level. Other variables such

as export volume, export value and the dollar exchange rate are likely to have an influence on the selling price of bigeye tuna at the industry or export level, in fresh or processed form.

Price fluctuation is a phenomenon where the value of a commodity experiences continuous changes, either up or down, due to market mechanisms. Tuna prices are influenced by several factors, including the fishing season [7]. In research related to fishermen's business profits, fishermen's selling prices influence the profits obtained by fishermen's businesses. Fish selling prices affect operational costs and sales or production volume (Sabu *et al*, 2024). Fish selling prices at the fisherman level are greatly influenced by activities directly related to fishermen, such as operational costs, fishing seasons, which in this study were examined by fishing months, and the small number tuna in the field. The smaller the number tuna produced due to resource scarcity, the price will tend to rise, and conversely, the more tuna caught due to the abundance of fish resources, the price will tend to fall.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3909137203	7	558448171.9	16.671	.000^b
	Residual	937970450.5	28	33498944.66		
	Total	4847107654	35			

a. Dependent Variable: bigeye_tuna_selling_price
b. Predictors: (Constant), bigeye_fishing_operational_costs, fishing_month, bigeye_tuna_export_quantity, dollar_exchange_rate, bigeye_tuna_production_value, bigeye_tuna_export_value, bigeye_tuna_production_quantity

Figure 5. F-Test Result

The analysis used to see whether the 7 independent variables have an effect on the dependent variable is by using the F test. The results of the F test analysis show that the significance value is 0 and this value is smaller than 0.05 so it can be said that the 7 independent variables have a simultaneous effect on the dependent variable. Some independent variables that do not have a direct effect on the selling price of bigeye tuna are the rupiah exchange rate against the dollar, export value and export volume but if these variables are combined together with the variables of operational costs, production quantity, production value, fishing month it turns out to have a real influence on the selling price of bigeye tuna at the Cilacap fishing port, but perhaps the magnitude of the influence is not as significant as operational costs, production quantity, production value and fishing month.
The selling price of bigeye tuna at the industry and fisherman levels is clearly different. Prices at the fisherman level tend to be lower because fishers are the producers, while industry prices are much higher due to additional costs such as transportation, fish processing, and export or product distribution costs. Fish prices tend to rise at the industry level when exports are high and fall when exports decline. If international prices are high, industry prices will also rise to achieve export margins. Exchange rate fluctuations also have an impact; a weaker rupiah against the dollar will attract exports, pushing local prices up. The regression analysis generated from the t-test results shows the unstandardized B value, where the constant is 58,062.393. The dollar exchange rate is -0.778. The tuna export value is 0.159, the export value is -0.019, the production volume is -0.108, the production value is 0.004, the fishing month value is -1399.009, and the operational cost value is -0.0000005276. The resulting regression model is:

$$Y = 58{,}062.393 - 0.778\ X1 + 0.159\ X2 - 0.019\ X3 - 0.108\ X4 + 0.004\ X5 - 1399.009\ X6 - 0.0000005276\ X7$$

Exchange rate has a negative effect on fish selling prices with a coefficient of -0.778. This coefficient value indicates that each unit increase in the exchange rate (depreciation of the rupiah against the US dollar) will reduce the selling price of fish by 0.778 units, assuming other variables are held constant. This finding implies that exchange rate fluctuations play a significant role in determining the price dynamics of fishery commodities. Exchange rate depreciation can increase the cost of production inputs that depend on imports, so industry players try to reduce selling prices to maintain competitiveness in the export market. Conversely, when the exchange rate appreciates, the selling price of fish in the domestic market tends to increase due to reduced export incentives and increased domestic supply. The amount of tuna production has a negative value because the amount of production decreases, so prices will tend to increase due to the scarcity of fish resources.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.898^a	.806	.758	5787.82728	.806	16.671	7	28	.000

a. Predictors: (Constant), bigeye_fishing_operational_costs, fishing_month, bigeye_tuna_export_quantity, dollar_exchange_rate, bigeye_tuna_production_value, bigeye_tuna_export_value, bigeye_tuna_production_quantity

Figure 7. Deterimation Result

The results of the determination analysis show the magnitude of the independent variable against the dependent variable in the form of R square. The r square value produced in this study

is 0.805 or 80.5% and the remaining 19.5% is influenced by other variables not examined in this study. Some variables that have not been examined in this study are the quality of bigeye tuna, the weight and length of bigeye tuna, and the selling price of processed bigeye tuna products. The quality, weight and length of bigeye tuna were not obtained due to the lack of data availability related to these variables, especially the data needed is past data. Meanwhile, the selling price of processed bigeye tuna products is difficult to obtain due to the difficulty of accessing information related to company prices.

CONCLUSION

The t-test results show that the variables of production quantity, production value, fishing month and operational costs affect the selling price of bigeye tuna at Cilacap fishing port. While the variables of the rupiah exchange rate against the dollar, the amount and value of exports do not significantly affect the selling price of bigeye tuna at Cilacap fishing port. The results of the F test show that the variables of the dollar exchange rate, the amount and value of exports, the amount of production, production value, fishing month and operational costs simultaneously affect the selling price of bigeye tuna. The resulting selling price determination model is $Y = 58062.393 - 0.778 X_1 + 0.159 X_2 - 0.019 X_3 - 0.108 X_4 + 0.004 X_5 - 1399.009 X_6 - 0.0000005276 X_7$. The influence of these variables on the selling price of bigeye tuna is 80.6%, while the remaining 19.4% is influenced by factors outside the study.

The limitations of this study are the lack of data due to the difficulty of finding historical data, so the time span used in this study is data from 2022 to 2024. Fish quality and size also need to be examined for further research to obtain better results. In this study, fish quality and size were not measured because at the fisherman level, quality does not affect prices, whereas at the industrial level, quality and size influence export products.

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