



The impact of the increase in fuel price on the economy of small-scale fisheries in Riau Province, Indonesia

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Abstract. The increase in diesel prices has had a major impact on the economy in various sectors including the capture fisheries sector. This is because diesel is the biggest cost for fishing operations. This study aims to determine the impact of the increase in diesel fuel on the economy of small-scale fisheries. The method used is survey method. Data collection was carried out by interviewing fishermen, bosses, and diesel retail traders using a patterned questionnaire. The research location is located in Rokan Hilir Regency, Riau Province, Indonesia. The results showed that a 32% increase in diesel prices had no effect on fishing operations but did affect fishermen's operational costs and ultimately reduced their income. To overcome this, the government provides subsidies to fishermen. It's just that the subsidy given is smaller in value compared to the decrease in income due to the increase in diesel prices. To overcome this, fishermen carry out various strategies such as making savings on household expenses and making loans to tauke (agents). Government policies such as establishing gas stations for fishermen in fishery centers are expected to have a better impact on the fishermen's economy.

Key Words: fishermen's income, government policy, household expenditure, operational costs.

Introduction. The increase in the price of fuel oil has a major impact on the global economy, especially developing countries. The impact of the increase is negative to the economic activity. This also affects monetary and fiscal policies, and price shocks, especially for countries where most of their fuel comes from import activities (Meyer 2018). According to Gabhane and Gabhane (2021), the increase in fuel prices in India has led to an increase in production costs of various commodities, transportation costs and caused inflation. According to Rozy Hrp and Aslami (2022), the increase in fuel prices will affect all levels of society in Indonesia. Significant impacts that occur are rising prices of goods and services, slowing economic growth and also the possibility of inflation. The biggest impact was felt by people with small and medium scale businesses. The same situation is thought to affect the economy of small-scale fisheries.

FAO (2015) describes small-scale fisheries as traditional fisheries involving household fishing, using relatively small capital, labor, and fleets. Apart from that, the fishing grounds are relatively close to the coast and the main catches are for local consumption. According to Law no. 7 of 2016, small fishermen are fishermen who catch fish to fulfill their daily needs, both those who do not use fishing vessels and those who use fishing vessels under 10 GT. One of the small-scale fisheries production centers in Indonesia is located in Rokan Hilir district, Riau Province, known as Bagansiapiapi (Afsohinas et al 2021). Yulinda et al (2021) states that this area is located at the confluence of two currents belonging to the Indonesian Ocean and the South China Sea, which is called the Malacca Strait, with quite high fish production. Until now, Bagansiapiapi is still one of the largest fish producers on the east coast of Sumatra.

Furthermore, according to Hendrik (2022) small-scale fishing businesses have very limited capital including for the purchase of diesel fuel which is a large part of the fishing operating costs. According to Sari et al (2020), in sea activities the cost of diesel fuel reaches 50-70% of operational costs. Research results of Daiyuddin et al (2015) shows that the increase in diesel prices by 7.8% has resulted in an increase in

operational costs for fishing by 7-7.8%. Furthermore, it was stated that the smaller the size of the ship, the greater the increase in operational costs. The increase in diesel fuel by the government through Minister of Energy and Mineral Resources Decree No. 218 (2022) on September 3, 2022, has increased the price of diesel fuel from IDR 5,150/liter to IDR 6,800/liter. The increase in diesel prices by 32% is expected to affect the fishermen's economy. This study analyzes the impact of rising diesel prices on the economy of small-scale fisheries in relation to fishing operations, increased operational costs and changes in fishermen's income, as well as strategies and policies in dealing with these impacts.

Material and Method. This research was carried out from October to November 2022, after the Indonesian government increased the price of diesel fuel on September 3, 2022, by 32%. The research location was determined deliberately, namely in three fisheries centers in Rokan Hilir Regency. This area has some of the main fisheries production centers located on the East Coast of Sumatra, Indonesia. The method used in this study is a survey method (Groves et al 2011). Survey method research uses samples from the population using patterned questionnaires. Primary data was collected by conducting interviews with 50 fishermen, 10 tauke (collectors, agents, financiers), 10 retail fish traders and 5 retail diesel dealers. Fishermen's data collection is carried out in a stratified manner based on fishing trips. The data collected includes the fleet and fishing gear used, time of each fishing trip, monthly fishing frequency, fishing area, number and type of catch, fish prices, operational costs, use of diesel fuel before and after the price increase and other supporting data. Data were analyzed quantitatively and qualitatively, to determine the effect of rising diesel prices on fishermen's income before and after the independent sample t-test was carried out (Walpole 1992).

Results and Discussion

General state of fisheries. Rokan Hilir Regency with the capital city of Bagansiapiapi is one of the most important fishery production centers in the Malacca Strait on the East Coast of Sumatra. In the 1930s Bagansiapiapi was once the largest fish producer in Indonesia where fish production reached 300,000 tons per year. This situation causes Bagansiapiapi to become the port with the most fish production and the second busiest in the world after Norway. Currently, fishery production continues to decline due to over-exploitation. However, this area is still one of the most important fisheries production centers on the East Coast of Sumatra (Zakya & Rusli 2017).

Based on the Rokan Hilir Regency Fisheries Service Report (2021), the number of fishermen in this area is 7175 fishermen, of which 95% are small-scale fishermen. For the number of vessels, there are 2,863 units, all of which use diesel fuel. The number of fishing gear used was 3822 units. Of these, seine nets and gillnets are the dominant tools used by fishermen. Based on Riau Province Fisheries Data for 2021 (BPS 2021), as much as 60% of fisheries production in Riau comes from this area.

Capture fisheries business conditions before and after the fuel price increase. Capture fisheries business in this area can be grouped into two parts, namely small-scale capture fisheries with fleets below 10 GT and medium and large scale capture fisheries with fleets above 10 GT. Based on research, small-scale capture fishing trips last for 1 to 3 days, with 55% one day fishing trips, 25% with two days fishing trips and 20% with three days fishing trips. In one month, fishermen that make one day fishing trips do 16 trips, fishermen who do two days fishing trips do 8 trips and fishermen that do three days fishing trips make 5 trips.

The duration of each fishing trip is related to the distance to the fishing ground and the amount of diesel fuel used. One day fishing trips are done at 2-4 miles from the shore, two days fishing trips are done at a distance of 4-8 miles from the shore and fishermen who do 3 days fishing trips fish at more than 8 miles from the shore. The increase in diesel prices that had been set by the government on September 3, 2022, had no impact on fishing operations such as fishing area, fishing frequency, fishing trip

and the amount of diesel fuel used. According to respondents, they are still able to carry out fishing as before the increase in diesel prices because the tauke is still able to bear the operational costs of the boat and lend money for the fishermen's household needs. This situation shows that the increase in diesel prices did not affect fishing operations in Rokan Hilir District. Yet according to research results of Priyo (2015), increase in diesel prices has had an impact on fishing operations such as reducing the number of vessels, changing the type of fishing gear and reducing the frequency of going to sea in Kubu Raya Regency, West Kalimantan Province.

Operating costs. Operational costs in the fishing business consist of diesel costs, personal costs (beverages, food etc.), and costs for purchasing ice. The amount of this operational cost really depends on the length of one fishing trip and the distance between the fishing base and the fishing ground. Of the various operational costs, diesel fuel costs are the largest operational costs. Research results of Pratama (2020) shows that for the capture fisheries business, expenses for purchasing diesel fuel reach 50-70% of the total operational costs of catching.

The price of diesel fuel before the increase was IDR 5,150/liter and increased to IDR 6,800/liter after September 3, 2022. After the increase in fuel prices, diesel was 32% more expensive than before. This diesel price is the price set by the government gas stations, but there are no gas stations for fishermen in this area. So, fishermen are forced to buy diesel fuel through retail diesel traders at even higher prices. According to diesel retail traders, they buy diesel at gas stations and then sell it to fishermen at fishing bases at prices that are 11-14.5% higher than the price set by the government, depending on the distance from the gas station to the fishing base. Based on calculations, it is found that the fishing community buys at an average of 12.5% more expensive fuel than the price at the gas station.

Fishermen who conduct one day fishing trips spend as much as 30-39 liters of diesel with an average of 35 liters. For fishermen who spend two days per trip, they spend as much as 50-72 liters of diesel with an average of 60 liters. Meanwhile, fishermen who spend three days per trip use as much as 82-105 liters of diesel fuel with an average of 90 liters. Based on the calculation results, it was found that every ship in this area spent an average of 62 liters of diesel. So, before the fuel price hike, fishermen spent IDR 358,980, and after the increase spent to IDR 474,300 per trip.

Apart from diesel fuel costs, consumption costs also increased by 16-20%. The lowest increase occurred for fishermen who made three days trips. This is due to more efficient spending on personal costs for three days fishing trips. Based on the results of calculating the average consumption of each fisherman before the increase in diesel fuel, the value was of IDR 67,000 and after the increase in diesel fuel was IDR 79,000 with an average increase of 18%. Another operational cost is represented by ice blocks (25 kg each). The price of ice blocks before the increase in diesel fuel was IDR 40,000/block and after the increase in diesel fuel was IDR 50,000/block. In each fishing trip, an average of 2 blocks of ice are used. The increase in operational costs was due to the increase in diesel prices, which in turn affected production costs and transportation costs. According to Malka et al (2022), the increase in oil prices in various developing countries, including in Pakistan, has caused a decline in economic growth and an increase in various general prices in the market, including prices for production and transportation costs. Based on this description, the increase in the average operational costs of small-scale fishermen before and after the increase in diesel prices can be seen in Table 1.

Table 1

Small scale fishermen's average operating costs

Operating costs	Price		Percentage increase
	Before	After	
Fuel Oil	USD 23.93	USD 31.62	32%
Personal costs	USD 9.3	USD 11.4	21.4%
Ice block	USD 5.3	USD 6.6	25%
Total	USD 38.59	USD 49.62	28.5%

Based on Table 1, the percentage for the cost of diesel fuel increased from 70.5% to 72.6% after the price increase. According to Saptanto et al (2016), in the capture fisheries business, expenses for the purchase of diesel fuel purchased at gas stations range from 50 - 70% of the total operational costs at sea. This situation shows that the operational cost of diesel fuel in this area is higher than the operational cost of diesel fuel in areas that have gas stations for fishermen. This is because fishermen in this area buy diesel from diesel traders.

Fish prices. According to Muslimin et al (2021), the price of fish depends on the amount of demand and supply and the higher the price of fish, the lower the demand for fish, while the lower the price of fish, the greater the demand for fish. In this study, the supply of fish before and after the increase in diesel fuel was relatively the same and changes in fish prices were more influenced by increases in transportation costs. According to Rozy Hrp and Aslami (2022), the increase in fuel prices had a major impact on the transportation sector, with costs increasing by 2.8% to 4.2%. According to fish traders, transportation costs in this area increased by an average of 4% after the increase in fuel prices, so that the price of fish at the consumer level increased by 5%. Further explained by the fish traders, an increase in the price of fish by 5% causes a decrease in the amount of fish they sell by 3-8%, depending on the type of fish. This situation also affected fish prices at the fishermen's level, which decreased by 6.6 - 12.5%.

Based on Table 2, it can be seen that the price of fish has decreased after the increase in diesel prices of 6.6-12%. The highest decrease occurred for other types of fish, such as pomfret (Bramidae), stingray (Batoidea) and mullet (*Moolgarda seheli*). According to fish traders, the large decline in pomfret, stingray and mullet was due to lower demand for these three types compared to other types of fish. According to Faqih and Rangka (2021), fish price factor has a significant effect on consumer demand, while the number of family dependents and income does not affect the demand and price of fish.

Table 2

Fish prices before and after diesel fuel cost increase at fishermen's level

No.	Fish species	Before	After	Percentage of decrease (%)
1	Goulash fish (<i>Johnius carouna</i>)	USD 0.7	USD 0.6	10
2	Sagor catfish (<i>Hexanematichthys sagor</i>)	USD 0.33	USD 0.3	10
3	Fourfinger threadfin (<i>Eleutheronema tetradactylum</i>)	USD 3	USD 2.8	6.6
4	Shrimp (Caridea)	USD 1	USD 0.93	6.6
5	White eel tailed catfish (Plotosidae)	USD 1.67	USD 1.53	8
6	Other	USD 0.53	USD 0.46	12.5

Fishermen's economic condition before and after the fuel price increase. The economic condition of fishermen is influenced by the number of catches, fish prices, catch acceptance rate, and income from catches.

Catch. The amount of catch is influenced by various factors such as fishing vessel, fishing gear and fishing area. According to Pratama et al (2016), fish catches are influenced by the length of the trip, the type of vessel, fishing gear and the fishing area. Based on the research results, it was found that the increase in diesel prices in this area did not affect catches, because the increase in diesel prices did not affect fishing duration, fishing frequency and fishing grounds. According to the results of calculations for fishermen who did one day fishing trips before and after the increase in diesel prices, their catch ranged between 48-73 kg with an average of 61 kg. For fishermen who make two days fishing trips, the catch ranges between 124-178 kg with an average of 143 kg. Meanwhile, fishermen who made fishing trips for three days, their catch ranged between 283-356 kg with an average of 310 kg for each fishing trip.

Fishermen's income. Fishermen's income depends on the fishing vessel, fishing gear and the length of each fishing trip. For one day fishing trips the vessel used is of 2-3 GT with a total of 2 fishermen. Two days fishing trips use vessel of 3-4 GT with a total of 3 fishermen. Three days fishing trips use vessels of 4-8 GT with a total of 5 fishermen. According to the custom in this area, profit sharing is adjusted according to the number of fishermen plus the fleet and fishing gear, where 1 vessel is valued at 1 point, fishing gear is valued at 1 point and each fisherman is valued at 1 point. Based on this, it was found that one-day fishing trips profit was divided into 4 parts, two days fishing trips profit into 5 parts and three days fishing profit into 7 parts. This division is carried out after deducting the operational costs of catching.

From the calculation results in Table 3, it can be seen that the increase in fuel prices has caused a decrease in the net income received by fishermen. Fishermen who fish for 3 days per trip experience the smallest percentage decrease in income compared to other fishermen. This is due to efficiency in operational costs and the catch of more fish than other fishermen. Based on fishing trips, it was found that fishermen who made trips with longer working hours had a higher average income compared to fishermen who made trips with fewer working hours. According to Prawiti and Dewi (2020), the number of working hours, experience and operational costs affect fishermen's income. Furthermore, Putri and Wulandari (2020) also stated that work experience and the number of working hours had a significant effect on fishermen's income. Based on statistical test results of the independent samples t-test (Walpole 1992), a significant two-way statistical test or two-sided test was obtained (0.071), meaning that there was a significant difference between fishermen's income per trip before and after the increase in diesel fuel costs with a confidence level of 90%.

Table 3

Average income of fishermen for each trip

<i>Description</i>	<i>Trip duration</i>		
	<i>1 day</i>	<i>2 days</i>	<i>3 days</i>
Catch	61 Kg	143 Kg	310 Kg
Price before	USD 1.13	USD 1.20	USD 1.28
Price after	USD 1.05	USD 1.11	USD 1.18
Revenue before	USD 68.89	USD 171.50	USD 395.35
Revenue after	USD 63.78	USD 158.97	USD 366.52
Net income before	USD 50.05	USD 143	USD 355.28
Net income after	USD 39.27	USD 121.70	USD 313.95
Fishermen's income before	USD 12.51	USD 28.60	USD 50.75
Fishermen's income after	USD 9.81	USD 24.34	USD 44.85
Decrease in revenue	USD 2.7	USD 4.26	USD 5.90
Decrease percentage	21.5 %	14.9%	11.6%

From the calculation results, one day fishing trip fishermen with the fewest working hours have the smallest average income and experience the largest decrease in income due to the increase in diesel prices. This situation shows that the impact of the increase in diesel

prices is greater for fishermen with a lower business scale. This also applies to aquaculture, where according to Hendrik et al (2022) the increase in production costs has a greater impact on micro and small scale cultivators compared to medium and large scale cultivators.

Fishermen's strategy in overcoming diesel fuel cost increases. Based on the results of the study, it was found that after the increase in diesel prices, 60% of fishermen were no longer able to meet their daily needs. As much as 25% of fishermen can fulfill their daily needs but are no longer able to save money, while 15% of fishermen are still able to make ends meet and save money, but their savings have decreased by 30-50% compared to before the increase in diesel prices. According to Tambulon et al (2022), there are three strategies carried out by fishermen in meeting reduced income, namely the savings strategy by minimizing household expenses. The strategy is to maximize resources by looking for side jobs when not fishing. Fishermen also borrow money from patrons or neighbors and family to meet needs. According to the patron's statement, since the increase in diesel fuel, 60% of fishermen have borrowed money to fulfill their daily needs, so that fishermen's loans have increased by an average of 30% after the increase in diesel prices. Furthermore, Priyo (2015) explained the strategy of small-scale fishermen in dealing with rising diesel prices was carried out by building patron-client relationships, utilizing the role of savings and loan cooperatives and artisan gatherings.

To overcome the problem of increasing fuel prices and decreasing people's income, the government has made a policy through Minister of Energy and Mineral Resources Decree No. 218 (2022). This policy has created a scheme by providing subsidies of IDR 150,000/month for affected communities. This subsidy assistance has been carried out since the increase in fuel prices from September to December 2022. Based on research results, as many as 80% of fishermen have received this fuel subsidy assistance. Unfortunately, this assistance is not balanced with the decrease in their income. For example, one day fishing trip fishermen experienced a decrease in income of IDR 646,608 for a month, while the compensation they received was only IDR 150,000 a month.

The government's strategy in overcoming the increase in fuel prices by providing subsidies is considered inappropriate by fishermen because the value of the subsidy is far below the decrease in their income. It is estimated that the policy of providing supporting facilities such as the provision of gas stations at fishery centers is much better and has a greater impact on fishermen in this area. For example, every one day fishing trip fisherman buys diesel fuel, which costs an average of IDR 512,000, more expensive than buying it at gas stations every month. Based on this, the strategy of establishing gas stations in various fishery production centers will provide greater benefits in improving the small-scale fisheries economy in this area and in various other regions in Indonesia.

Conclusion. The increase in diesel prices by 32% had no effect on fishing operations and catches but did affect operational costs. Operational costs increased by an average of 28.5% and decreased revenue by an average of 16%. Based on the results of the independent samples t-test, we found out that the increase in diesel prices had a significant effect on fishermen's income. The fishermen's strategy for overcoming the decrease in income due to the increase in diesel prices was by making savings on household expenses and making loans to patrons. Government policies by providing subsidies to fishermen have little impact on the lives of fishermen. Policies such as setting up gas stations at fishery centers are far more beneficial for fishermen because it will reduce operational costs in catching fish.

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