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Impact of Implementing Ex-Foreign Ship Moratorium Policy on Tuna Fishing Business in Benoa, Bali

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Abstract. Regulation of the Minister of Maritime Affairs and Fisheries number 56 of 2014 and Regulation of the Minister of Maritime Affairs and Fisheries number 10 of 2015 help realize responsible fisheries management and combat Illegal, Unreported, and Unregulated (IUU) Fishing in Fisheries Management Area of the Republic of Indonesia (WPP NRI). The policy of temporarily stopping permits (moratorium) for ships manufactured overseas (ex-foreign vessels) directly impacts fishermen working on ex-foreign vessels in the form of reduced income and loss of livelihoods. The research used a retrospective approach where policy analysis is carried out on the consequences of a policy after the policy is implemented. It is usually referred to as an evaluative analysis model, so it is expected to produce information that can improve the quality of the policies implemented by the government. The study aimed to determine the moratorium's impact on capture fisheries licensing on business activities, especially on fishing effort, catch per unit effort (CPUE), and socioeconomic conditions of fisheries at Benoa Harbor, Bali. This research was conducted from March to October 2022 in the Benoa Harbor Area, Bali. This study employs quantitative and qualitative methods. The data were obtained from observation, interviews, questionnaires, and literature/document studies. The moratorium policy for ex-foreign vessels, followed by a ban on transshipment, significantly changed the pattern of trade, particularly for tuna, which was dominated initially by fresh tuna to frozen tuna with a lower value. The longline catches are dominated by *Thunnus alalunga*, followed by *Thunnus maccoyii*, *Thunnus albacares*, and *Thunnus obesus*. The total of ships in 2014 was 915 units, and only 246 ships remained in 2018. The significant decrease in fish landings in 2015-2017 is a real impact of the moratorium on ex-foreigners in Benoa. The results of the data analysis show that in 2014 the number of attempts was 2,264, which continued to decline until 2018, with only 697 trips.

Keywords: Benoa, moratorium, tuna, fishery business

I. INTRODUCTION

Indonesia is the largest tuna-producing country with potential in the international tuna market. Based on official FAO data, Indonesia is a country that deserves to be reckoned with in the tuna fishing business. In 2017 Indonesia's tuna export volume reached 198.131 tons with a value of 659.99 million dollars [20]. Bali is the province with the most significant tuna production value in Indonesia, which reached IDR 281.43 billion with a production volume of 6,144 tons in 2020 [1]. The industrial-scale tuna longline fishery at Benoa Port is a high-seas fishery with most fishing grounds outside the Exclusive Economic Zone (EEZ) or international seas [2].

The majority of tuna longline vessels (>70%) fish outside the waters of the International Exclusive Economic Zone (EEZ) [3].

KKP stated that tuna is the second largest foreign exchange earner after shrimp [4]. The increasing number of tuna fishing industries impacts the development of tuna fishing units. Several domestic and foreign companies established in the Benoa Harbor area are trying to procure trained, foreign-made, or used fishing vessels that have carried out fishing operations outside Indonesian waters. Using fishery resources outside the EEZ or high seas by Indonesian ships is not optimal because boats capable of crossing the high seas are dominated by foreign-made ships with adequate technology. The use of foreign-made

vessels is because shipyards in Indonesia have been unable to produce fishing vessels that meet the criteria for fishing vessels [5]. In addition, the price of foreign-made vessels is lower, and the age of the vessels is still quite economical, so it is profitable for fishing businesses [5].

The movement of foreign ships that violate the territorial boundaries of the State violates the sovereignty of the Indonesian State with IUU Fishing activities. IUU fishing, which causes state losses, mainly occurs in points rich in fish, such as the Natuna Sea, South Arafura, North Bitung, Bird's Head (West Papua), and the Indian Ocean [6]. Then a policy Number/Regulation of the Minister of Maritime Affairs and Fisheries/2015 was issued concerning Temporary Suspension (Moratorium) of Ex-Foreign Ships and Prohibition of Transshipment [5]. The Ministry of Maritime Affairs and Fisheries carries out illegal fishing prevention policies to uphold water sovereignty [7]. The moratorium period was initially six months and extended for another six months [8].

The dominant tuna longline in Indonesian waters in 2012 was 1,459 units, but it decreased by 10.75% annually and became 429 units in 2020 [9]. The fishing moratorium effectively ensures the sustainability of fish resources [11]. However, policies and regulations will have positive and negative consequences in the short term but much more significant impacts on fishing businesses, governments, and communities [8]. This research needs to be carried out to determine the fishing effort (CPUE), the amount of catch obtained, and the impact caused by the imposition of a moratorium policy on ex-foreign vessels at the port of Benoa.

II. METHODS

This research was conducted from March to October 2022. The research location is in the Benoa Harbor Area, Bali. This study employs quantitative and qualitative methods. Quantitative method used to estimate impacts of a moratorium policy on ex-foreign vessels based on the numbers obtained. The qualitative method approach is applied to identify the impact of the moratorium policy on capture fishery business by the situation in location research. The data in this study were obtained from primary data sources and secondary data, with data collection techniques used through observation, interviews, questionnaires, and literature/document studies.

Primary Data

Observations were made through activities to identify the condition of vessels, fishing gear, and companies whose main commodity is tuna. This identification was made to discover the changes that occurred after the issuance of the Ex-Foreign Ship Moratorium Policy at Benoa Harbor.

Interviews were conducted with 33 fishing companies and 22 tuna processing companies [21]. In addition, interviews were also conducted with small fishing businesses in Benoa Harbor. Questionnaires were distributed to company employees and ship crews involved in the tuna commodity at Benoa Harbor. The sampling technique used to determine respondents is the Non-Probability Sampling technique: Purposive Sampling (purposeful sampling) using the Google Form media. The results of the responses are presented in a graph of the total income before and after the moratorium.

Secondary Data

Some other data is also needed as additional information. Sources of data are books, journals, government publications, as well as sites or other supporting sources, including (1) The Pengambangan VAT Fishing Boat Service Post in Benoa; (2) Office of Maritime Affairs and Fisheries Province of Bali; and (3) Indonesian Tuna Longline Association.

Analysis Data

CPUE (Catch Per Unit Effort) is the annual catch rate obtained using time series data. According to Noija [13], the formula used to calculate the CPUE value is as follows:

$$CPUE_t = \frac{\text{Catch}-t}{\text{Effort}-t}$$

CPUE_t = catch per fishing effort in year t (kg/trip)

Catch-t = catch in year t (kg)

Effort-t = fishing effort in year t (trip)

Policy Impact

The impact of the policy only focused on the condition of the tuna fishing business at Benoa Harbor, such as:

- Total Tuna Production (Catch and Processing),
- Tuna Catching Efforts,
- Absorption of Labor and Income (Employees and Crew),
- Small and Medium Enterprise Income.

III. RESULTS AND DISCUSSION

Impact of Ex-Foreign Ship Moratorium Policy

The moratorium on fishing permits targets foreign and ex-foreign fishing vessels built abroad in Indonesia's traditional fishing grounds. Foreign ships are ships flying flags other than the Indonesian flag. Meanwhile, ex-foreign ships (made abroad) are ships made outside the country of Indonesia (overseas) but whose legal status is already with the Indonesian flag [13].

The moratorium policy for ex-foreign vessels, followed by a ban on transshipment, significantly changed the pattern of trade, particularly for tuna, which was dominated

initially by fresh tuna to frozen tuna with a lower value. This policy greatly affected the people's economy regarding regional income and employment [10]. Tuna production at Benoa Harbor includes whole tuna, loin tuna, pocket tuna, steak tuna, tuna strips, and tuna heads.

The condition of the longline tuna fleet at Benoa Harbor after the Moratorium policy was to reduce the number of tuna longline fleets in operation. One hundred eight are registered as fishing boats at the Minister of Marine Affairs and Fisheries, but their permits are no longer active [14]. The employees will ask for the deregistration of these ex-foreign ships [14].

As a result of the temporary license suspension, the company could not operate fishing boats, so the input of raw materials for UPI was drastically reduced and disrupted the company's operations. The number of fishing fleets that can drive affects the total fishing effort and catch. The majority of positive sentiment came from the Ministry of Home Affairs, Ministry of Maritime Affairs, and Fisheries, while the opinion from the public and industry players was negative.

Amount of Tuna Production (Catch and Processing)

The total of tuna catches landed at Benoa Harbor from 2014-2018 can be seen in Table 1.

TABLE 1
 TOTAL OF CATCHES TUNA COMMODITY
 Tuna Commodity

Year	Tuna Commodity			
	<i>Thunnus albacares</i>	<i>Thunnus maccoyii</i>	<i>Thunnus alalunga</i>	<i>Thunnus obesus</i>
2014	905,854.6	6,599,020	8,279,313	2,161,069
2015	772,270	1,274,859	1,085,089	1,018,123
2016	765,402	1,781,066	1,267,118	277,025
2017	592,689	1,595,134	1,810,001	232,764
2018	1,009,703	1,680,404	2,271,381	552,052

After the moratorium, there was a drastic decrease in tuna, skipjack, and cob production, which landed at Benoa Harbour. Based on the results of data processing, it is known that the longline catches are dominated by *Thunnus alalunga*, followed by *Thunnus maccoyii*, *Thunnus albacares*, and *Thunnus obesus*. The most stable catch commodity is *Thunnus alalunga*. The yield of *Thunnus obesus* decreased drastically in 2016. Due to these factors, the total production in 2015 and 2014 drastically reduced by around 50 thousand tonnes.

The significant decrease in fish landings in 2015-2017 is a real impact of the moratorium on ex-foreigners in Benoa. Former foreign ships are stalled so that productivity decreases. The catch reached millions of tons before the moratorium. It dropped down to less than half of the previous landings. Conditions were more stable in 2018. The moratorium on permits for foreign vessels operating

in Indonesia has increased fishermen's catches due to the reduction in IUU fishing by foreign vessels [15].

Conditions in other areas also show similar results. Catch production in Bitung reached its highest peak in 2014, amounting to 305,435 tons, decreased drastically in 2015, amounting to 250,485 tons [5]. Decreased landings during the moratorium period in Larantuka (average monthly production during the moratorium 164,479 kg ± 120,181 sd. Compared to the average monthly output before the moratorium [8]. Capture fisheries production in Bitung City decreased drastically in 2015, with only approx 39.71% of the total production volume in 2014 [17].

Tuna Catching Efforts

The tuna landed at the Benoa Harbour and was caught in a fishing ground around WPP 573 and the high seas of the Indian Ocean. Attempts to catch are made with longline tuna.

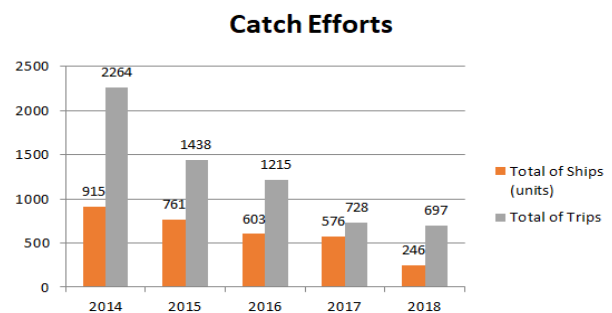


Fig. 1. Graph of Catch Efforts

Fishing trips carried out at fishing grounds WPP 573 and High Seas Indian Ocean can be seen in the graph above. The number of trips made continued to decrease from 2014 to 2018. the chart shows the number of ships dropping in the port of Benoa. The number of ships under 100 GT increased after the ex-foreign vessel moratorium. While on ships above 100 GT, there was a slight decrease. The moratorium policy in the short term will reduce the number of vessels carrying out fishing activities so that fishery production decreases, while in the long term, production will increase [5].

Tuna Catch per Unit Effort (CPUE)

The total of ships in 2014 was 915 units. The calculation is very different from 2018, with only 246 ships remaining. The total number of ships in Benoa registered as Indonesian Longline Tuna Association members was 246 in 2018, from 699 ships in 2013 [17]. Based on data from Benoa's KSOP, 173 ex-foreign fishing vessels are mooring at the Benoa Public Port. As many as 65 fishing vessels were built overseas that have never been registered as fishing vessels at the MMAF. Most tuna and live bait

fishermen agree that their fishing efforts have changed compared to the last five years [8].

The most commonly caught fish commodity landed at Bena Harbor is tuna. The dominant fishing gear used to catch tuna is longline or longline tuna. The CPUE calculation results for the last five years can be seen in Figure 2.

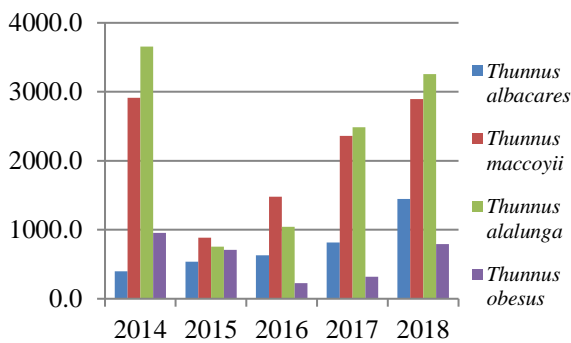


Fig.2. Catch Per Unit Effort (CPUE) Graph

Fluctuations in the number of catches, especially tuna landed at Bena Harbor in the 2015-2018 period, cannot be separated from the influence of the ex-foreign ship moratorium policy, where there has been a decrease in the number of fishing fleets and changes in fishing gear. The production data above shows that the number of fishing efforts is inversely proportional to the production results.

The results of the data analysis show that in 2014 the number of attempts was 2,264. The number of trips declined until 2018, with only 697 visits. This decline is thought to have occurred due to the moratorium on foreign ex-ships and transshipment at sea and the shift of longline fishing gear to other fishing gear, such as squid fishing rods. The decrease in longline fishing gear and the fleet of ships used in the Bena Port area resulted in decreased effort and production. The CPUE value drastically reduced in 2015 for *Thunnus maccoyii* and *Thunnus alalunga*. These two commodities increased in the following years. CPUE from 2016 to 2018 tends to increase for each item.

The issue of Illegal, Unreported, Unregulated (IUU) Fishing can be overcome by increasing monitoring facilities at sea which involve all monitoring stakeholders, including the community, and optimizing coordination with the Maritime Security Agency [5]. When global catches decrease, the fisheries sector in Indonesia continues to increase [19].

Labour Absorption and Income (Employee and Crew)

Fish catching and processing businesses consist of groups that have one unit. In practice, the crew goes to sea to get raw materials, and employees process the catch and prepare for the ship's departure. As a result of the moratorium, there has been an economic downturn in the

fisheries sector. One form of economic decline is the increase in unemployment due to thousands of ships being put on a moratorium so that crew members are unemployed [18].

The large number of vessels put on a moratorium has also cost many entrepreneurs, both ship owners and fishery processing industry players. Several companies whose fleets have been affected by the moratorium on ex-foreign ships have seen a reduction in the number of employees. Another problem is that the moratorium has caused many ex-foreign ships to pile up at ports, especially in Bitung, Bena, and Muara Baru [18]. The total captains and crew members were inversely proportional before or after the moratorium on ex-foreign ships. Total revenue on vessels under 5GT to 10GT tends to decrease. There was a significant increase for ships above 10 GT after the moratorium on ex-foreign ships. The amount of bonuses obtained before and after the moratorium on ex-foreign ships is the same.

Processing Units

The vessel decrease before and after the moratorium reduced employment in the fishing sector. The reduction in fleets also affected the number of trips made. Directly affect employment absorption and employee mobility. Ships affected by the ex-foreign moratorium policy and their crews and captains must stand afloat. The absorption rate of labor (traditional fishermen and crew members) in the capture fisheries sector in the 2014-2017 brackets decreased by 8,073 people or around 54% [17]. Fish processing units lack raw materials, resulting in employment termination for processing company workers and reduced income for other business actors [5]. The reduction in labor also occurred in the processing industry. This condition was also followed by implementing a *shift* work system or employee *rolling*, reducing working hours. The catch products ready to be supplied to the Fish Processing Unit (UPI) factory decreased by 578.34 tonnes/day to 137.16 tonnes or reduced by around 78% from an average of 716 tonnes/day in 2014 [16]. This decline in exports reached 200 thousand tons annually, and until 2017 after the moratorium was suspended for two years, Indonesia's fishery exports had not recovered [18].

Small and Medium Enterprise Income

The Bena Harbor area is an industrial, port, and government area. There are many grocery stalls, food stalls, clothes shops, and several minimarkets. The decline in fishing boat crews has also affected the income of small businesses around the West Pier. Consumer visits before the moratorium reached more than 150 people/month to less than 100 people/month. The lack of consumer visits greatly affected the income, which ranged from IDR

30,000,000 – IDR 225,000,000/month to IDR 15,000,000 – IDR 75,000,000/month.

Production and Export Value of Tuna in Bali

Tuna exports in Bali are essential in improving the economy through small, medium, and large-scale companies. After the moratorium policy, there was an

increase in tuna export production in whole or fresh conditions. However, there was a decrease in processed tuna types. The decline occurred due to a lack of raw materials for tuna landing at Benoa Harbor, so small businesses that do not have fishing fleets have difficulty obtaining raw materials.

TABLE 2
 SOCIOECONOMIC DATA FOR TUNA FISHING VESSEL CREW BEFORE THE EX-FOREIGN SHIP MORATORIUM

Age	Before the Ex-Foreign Ship Moratorium									
	Ship Size		Position		Total Income (trips/month)			Bonus Amount (trips/ month)		
	<100 GT	>100 GT	Captain	Crew	<5	5-10	>10	<5	5-10	>10
20-25	0	1	0	1	0	1	0	1	0	0
26-30	12	11	4	19	7	7	9	23	0	0
31-40	14	8	5	17	9	5	8	22	0	0
41-45	5	6	3	8	5	3	3	11	0	0
46-50	5	2	0	7	5	2		7	0	0
51-55	8	2	5	5	2	6	2	10	0	0
56-60	2	5	4	3	3	2	2	7	0	0
61-65	1	1	1	1	1	0	1	2	0	0
Total	47	36	22	61	32	26	25	83	0	0

Description: Each number for income and bonus followed by a million

TABLE 3
 SOCIOECONOMIC DATA FOR TUNA FISHING VESSEL CREW AFTER THE EX-FOREIGN SHIP MORATORIUM

Age	After the Ex-Foreign Ship Moratorium									
	Ship Size		Position		Total Income (trips/month)			Bonus Amount (trips/ month)		
	<100 GT	>100 GT	Captain	Crew	<5	5-10	>10	<5	5-10	>10
20-25	0	1	0	1	0	1	0	1	0	0
26-30	15	8	4	19	4	3	16	23	0	0
31-40	14	8	5	17	4	8	10	22	0	0
41-45	5	6	3	8	3	3	5	11	0	0
46-50	5	2	0	7	2	5	0	7	0	0
51-55	8	2	5	5	1	2	7	10	0	0
56-60	2	5	3	4	1	2	4	7	0	0
61-65	1	1	1	1	0	1	1	2	0	0
Total	50	33	21	62	15	25	43	83	0	0

Description: Each number for income and bonus followed by a million

TABLE 4
 PRODUCTION EXPORT OF TUNA IN BALI Sources: [22]

Commodity	Production (TON)					% up/down
	2014	2015	2016	2017	2018	
Fresh	5,165.53	3,502.81	5,691.70	8,029.16	7,395.75	15.87
Frozen	10,956.72	8,685.08	5,656.80	5,822.28	6,230.38	-11.42

TABLE 5
 EXPORT VALUE OF TUNA IN BALI Sources: [22]

Commodity	Value (US \$)					% up/down
	2014	2015	2016	2017	2018	
Fresh	32,160,288.2	20,549,534.4	34,714,459.9	55,711,165.6	56,931,613.3	23.9
Frozen	44,179,644.1	49,750,184.1	45,246,604.7	85,544,028.4	155,839,288.6	43.7

Export production of fresh tuna has increased positively since 2015. Calculated from 2014-2015, it has increased by 15%—the contrast to the export production of frozen tuna products, which has decreased since 2015. The decline until 2018 was -11%. Indonesian tuna exports have three main markets: the Japanese market, the United States market, and the European Union market [23]. The Japanese market prefers fresh tuna because it is a raw material for making sashimi. Meanwhile, tuna consumers in the United States choose to eat sandwiches, so the American tuna market imports more frozen tuna [24].

The export value of tuna from 2014 to 2018 in Bali has increased. The value for fresh tuna is 23.89%, and frozen or processed tuna is 43.70%. The export value of tuna is highly dependent on the international standard price of the destination country. Most of the tuna exports are standardized in United States dollars. Although export production for frozen tuna has decreased, the export value has increased. It could be caused by the higher exchange rate for frozen tuna for the US and EU markets, compared to fresh tuna, Japan's primary market.

IV. CONCLUSION

Fluctuations in the amount of tuna caught landed at Benoa Harbor in the 2014-2018 period cannot be separated from the influence of the ex-foreign ship moratorium policy, where there has been a decrease in the number of fishing fleets and changes in fishing gear. This decrease is thought to have occurred due to the moratorium on foreign ex-ships and transshipment at sea and the shift of longline fishing gear to other fishing gear, such as squid fishing rods.

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