



Moratorium policy impact on purse seine fishing boats' income

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Abstract. This research was conducted at the Ocean Fisheries Port (PPS) of Kendari City, Indonesia. The research location was determined purposively with the consideration that it is the disembarkation of purse seine fishing boats. In determining the impact of the Moratorium policy on income and business feasibility of purse seine fishing boats, several types of data are used such as primary data and secondary data. Primary data was obtained directly through systematic interviews with priority elements of accuracy, consistency, and objectivity of information from fishermen. While secondary data was obtained through the collection of literature information sourced from books, articles, journals and some institutions that are relevant to this research. The study was accomplished for two months, from July to August 2019. The population of the study was all fishermen of mini purse seine fishing boats who disembarked their catches in Kendari PPS with a number of mini purse seine 61 boats (size > 30 GT) and 20 respondents of them were selected as samples. The results of the analysis showed that there is an improvement of the average income and feasibility obtained from the purse seine fishing business. Before the Moratorium policy, it reached USD 18,515.08 per year with R-C ratio of 1.15. However after the Moratorium, the average income was USD 158,398.04 per year with R-C of 2.04. The improvements were obtained because of the increase of production, selling prices and savings in variable costs as well.

Key Words: Moratorium, purse seine, income, feasibility.

Introduction. Purse seine is an important fishing tool for both coastal fisheries and offshore fisheries with the aim of catching fish, whose behavior includes shoal, and is close to the surface of the water. This fishing gear is widely owned by fishing entrepreneurs and becomes the backbone of fishing equipment and according to Subani & Barus (1989) generally purse seine fisheries in the world use one ship.

Currently, fishing business in Indonesia is growing rapidly and is not merely limited as an effort to increase household income, but it is already a fishing industry business oriented to increase the country's income and foreign exchanges. Prior studies have noted the importance of artisanal and small-scale fisheries (SSF) as a source of livelihoods, food security and income for millions of people around the world (Allison & Ellis 2001). In fact, sustainable fishing can determine the fishermen's livelihood and career (Allahyari 2009). However, various types and magnitudes of anthropogenic impacts, poorly studied fishing practice for instance, threaten the environmental, economic, and socio-cultural sustainability (Claudet et al 2006; Batista et al 2014). Lack of political willingness is one of the primary factors that indicate the paucity of governance in fishery (Carbonetti et al 2014).

Increasing fishermen income and the country's foreign exchange are not possibly to be realized based on the condition of the over-exploitation fish resources (Berkes et al 2001; CRS 2006; Johannes et al 2015), and according to Ceyhan & Gene (2014) environmental stressors such overfishing will result in lower profitability. The rapidness and scale of human impacts on marine species, such as climate change and exploitation for international markets, in simultaneity with a poor regulation of regime and lack of enforcement, make it especially difficult to protect marine species beyond areas of national jurisdiction (Ewell et al 2017).

The aim of the Moratorium on catch fisheries activity is to realize responsible fisheries management in order to restore the fish resources and the environment in Fisheries Management Area (The Ministry of Maritime Affairs and Fisheries Regulation No. 56 of 2014). According to Nurlaili et al (2016), the nation's resources hopefully can be enjoyed by its own people through the moratorium policy.

Research on the Moratorium policy concluded that this policy has impacted local fishery business, as Rahmayanti et al (2017) pointed out that the Moratorium policy has raised fishermen's income, supporting fishermen on operationalization of fish processing business, as well as impacting local economic conditions. The policy has not only improved small fishermen welfare, but this policy was also a way to realize the maritime sovereignty. By the fact that this policy has brought positive impact on local fishery business, Suhana (2015) argued that the participation of the stakeholders is needed to sustain the local fishery business progress.

The purpose of this study is to determine the impact of the Moratorium policy on income and business feasibility of purse seine fishing boats which disembark at the Ocean Fisheries Port (PPS) of Kendari City (PPS), Indonesia.

Material and Method. This research was conducted at the Ocean Fisheries Port of Kendari City (PPS), Indonesia. The determination of the research location was carried out purposively with the consideration that the location was the landing site of fishermen's catch. Another reason is that none of any analytical studies has been carried out in the location to examine the impact of the Moratorium policy on the income and feasibility of purse seine fishing boats.

The types of data used in this study were primary data and secondary data. Primary data was data obtained directly through systematic interviews with priority elements of accuracy, consistency, and information objectivity from fishermen. Secondary data was obtained through the collection of literature information sourced from books, articles, journals and some institutions that are relevant to this research. Data collection in this study was conducted for two months, from July to August 2019.

The population of the study were all fishermen of mini purse seine fishing boats who landed their catches in the site, there were 61 mini purse seine fishing boats (size > 30 GT) and the samples taken were 20 respondents.

The data analysis was used to determine the income and feasibility of the business, carried out by comparing revenue with production costs over a certain period of time (one time selling) with a formulation from Suratiyah (2006), a business feasibility formulation (Soekartawi 2003) as follows:

1. Revenue analysis:

$$I = TR - TC \quad (I = \text{income, } TR = \text{Total Revenue, and } TC = \text{Total Cost}) \quad \text{or} \quad = \sum (P.Q) - \sum (FC + VC);$$

2. Business feasibility:

R/C ratio with criteria if $R/C > 1$ means the business is feasible, $R/C < 1$ means it is not feasible and if $R/C = 1$ the business is break even point.

Results and Discussion

Fisheries management areas (WPP) 714 and 715. The Ocean Fisheries Port (PPS) of Kendari City based on the Ministry of Maritime Affairs and Fisheries Regulation No. 01 / MEN / 2009 concerning the Fisheries Management Area of the Republic of Indonesia has stipulated the distribution of WPP-RI 714, covering the waters of the Tolo Bay and the Banda Sea; and WPP-RI 715 including the waters of Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea and Berau Bay.

Fisheries Management Area or WPP (abbreviation of Wilayah Pengelolaan Perikanan) described the division of fisheries management areas based on ecology, regional characteristics, and fish resources used as a basis for sustainable fisheries management.

In Figure 1, fishing areas are distinguished according to the nature of the waters, types of caught fish and the use of fishing gear. Fishing ground for fishermen of PPS

Kendari who operate purse seine fishing gear fishing vessels > 30 GT is Fisheries Management Area (WPP) 714 Banda Sea and 715 Seram Sea at a depth of about 100 meters with mud and sand bottom waters. The distance traveled by fishermen from the fishing base to the fishing ground is about 10 miles.

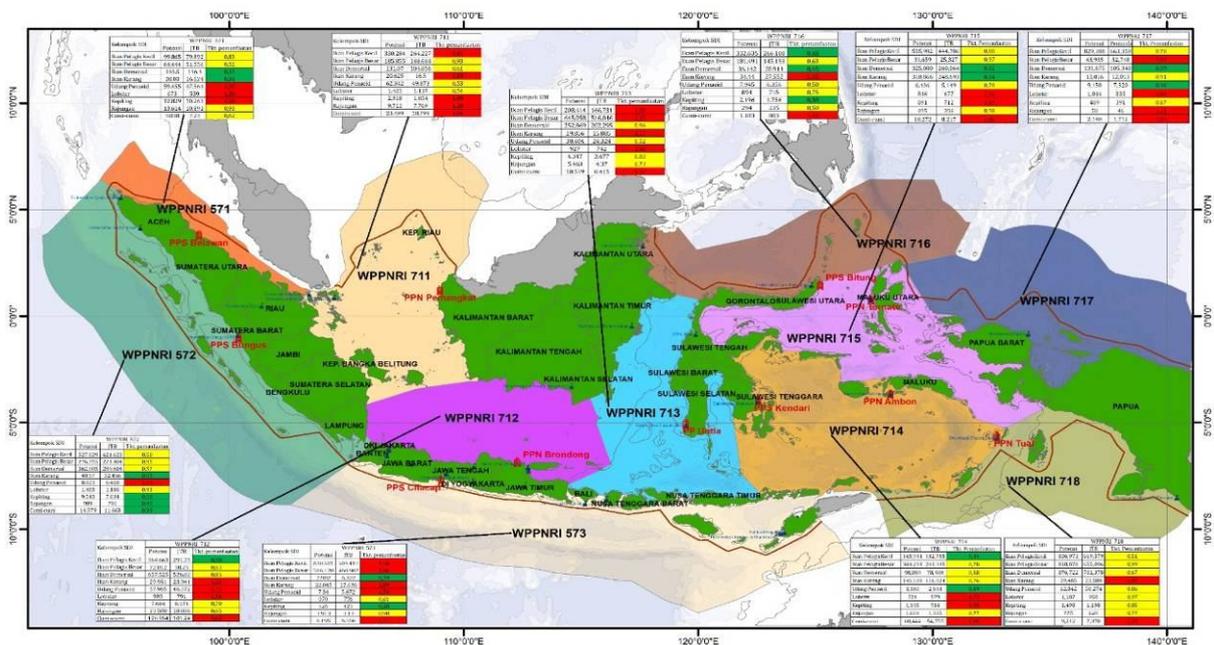


Figure 1. Fisheries management areas (WPP 714 and 715) of fishermen landing at PPS Kendari.

Purse seine ship business in PPS Kendari. Purse seine fishing boats at PPS Kendari generally execute unloading the catch of fishes, supplies and repairs. The size of them vary between > 10 GT, 10-30 GT and > 30GT.

Table 1 shows that the number of purse seine fishing boats at PPS Kendari during the last 5 years has increased more significant in particular to > 30 GT purse seine fishing boats than others. The existing condition of catch fisheries at PPS Kendari fisheries production before the Moratorium was dominated by ex-foreign boats or carriers who accomplish transshipment on the sea. In fact, after the current Moratorium policy, the catch fisheries production is dominated by local fishermen.

Table 1
Business conditions of purse seine fishing vessels by ship size in 2014-2018 at Kendari PPS

No	Year	Visit of the purse seine ship			Total visits
		< 10 GT	10-30 GT	> 30 GT	
1.	2014	3	244	27	274
2.	2015	6	232	27	265
3.	2016	9	275	41	325
4.	2017	15	201	61	277
5.	2018	19	253	61	333

Source: PPS Kendari 2019.

Production of purse seine fishing boats at PPS Kendari. Production is the amount of fish caught by fishermen during fishing activities using purse seine fishing gear. Catching efforts are related to fishing techniques, which can be done based on fishing trips, the frequency of catching, the strength of the ship's engine used or the length of time based on the fishing gear (Rijnsdorp et al 2000; Brill et al 2005; McCluskey & Lewison 2008). There are several factors that influence purse seine fishing such as the length of the trip, ice and the cost of supplies for fishing operations (Wiyono & Hufiadi 2014). The average of purse seine catches in the last five years at PPS Kendari can be seen in Table 2.

Table 2

Average production and production value in Kendari PPS

Year	Average production (ton)	Average price (USD kg ⁻¹)	Production value (USD)
2014	22,789	0.84	19,142.760
2015	25,193	0.91	22,925.630
2016	26,402	0.96	25,345.920
2017	29,151	0.96	27,984.960
2018	30,029	1.26	37,836.540

Source: PPS Kendari 2019.

Table 2 shows that in 2014-2018 there was an increase in the production and production value of purse seine fishing boats at Kendari PPS. In 2014, the production of purse seine fishing boats reached to 22,789 tons with a value of USD 19,142.760 whereas it rose to 25,193 tons with a production value of USD 22,925.630 in 2015. In 2016, the production of purse seine fishing boats reached 26,402 tons with a production value of USD 25,345.920. In 2017, it increased to 29,151 tons with a production value of USD 27,984.960. Meanwhile, it reached 30,029 tons with a production value of USD 37,836.540 in 2018. Graphs of production and price development can be seen in Figure 2.

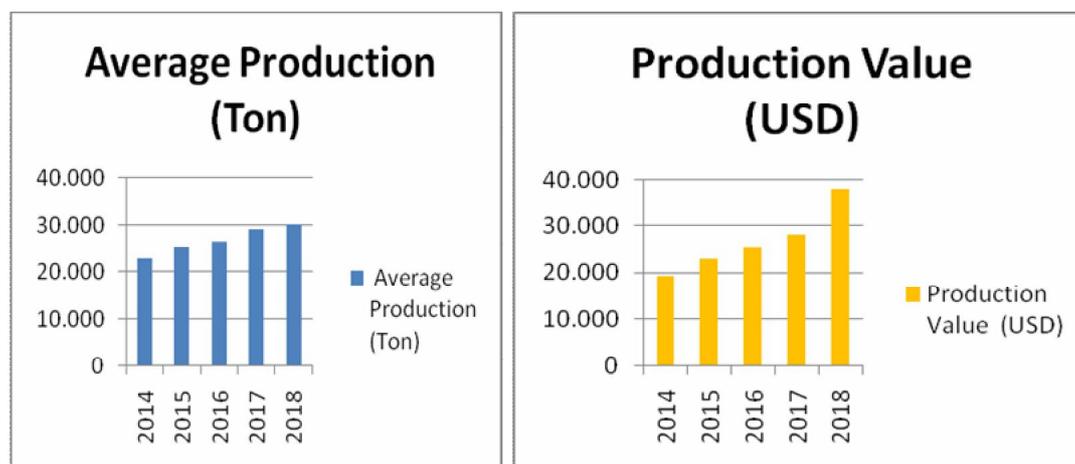


Figure 2. Graph of average and production value.

Figure 2 shows that after the Moratorium, there has been an increase from year to year both in average production and production value. It will have an impact on increasing the income of purse seine fishermen.

Fixed costs and depreciation before and after the Moratorium. The purse seine fishing business includes supplying, catching and marketing activities. Based on the scope of these activities, some data and information related to the calculation of the required costs are needed in order to get to an analysis of business such as fixed costs, variable costs, production and prices.

Fixed cost component in purse seine fishing business at Kendari PPS is equipped with infrastructure and other accommodations, for example; fishing boats, fishing nets, boat engines and other fixed costs. The fixed costs and depreciation of purse seine fishing boats before the Moratorium can be seen in Table 3.

The initial capital requirements in the catch fisheries business using purse seine fishing boat is USD 48,275.86 to buy a boat, USD 13,793.10 to buy an engine, and USD 1,611.15 to buy net purse seine. The average amount of capital requirements is USD 64,342.11. The depreciation cost before and after the Moratorium is similar because the equipment and facilities used are still the same.

Table 3

Average fixed costs of purse seine catch at Kendari PPS before and after the Moratorium

<i>Fixed costs</i>	<i>Volume</i>	<i>Unit</i>	<i>Price (USD)</i>	<i>Amount (USD)</i>	<i>Economic age</i>	<i>Depreciation</i>
Net	467	Meters	3.45	1,611.15	10	3.47
Ballast	100	Kg	2.90	290.00	5	0.71
Life vest	300	Unit	1.24	372.00	5	0.91
Fishing boat	1	Unit	48,275.86	48,275.86	10	104.12
Machine	1	Unit	13,793.10	13,793.10	5	33.76
Total fixed cost				64,342.11		142.97

Variable cost. There are variable costs needed in fishing purse seine business such as diesel fuel, ice blocks, oil, water and other accommodations. The amount of working capital for fishing purse seine before and after the moratorium is different. It depends on the price of the working capital components each year. Several components spend quite large which are the price of diesel fuel that used for the ship's engine, ice blocks and the salary/wage component.

Table 4 shows that before the Moratorium, the average variable cost per unit of boat required USD 3,444 per trip or USD 123,984 per year (in 36 trips a year). After the Moratorium, it increased to USD 4,257 per trip or USD 153,252 per year. The biggest variable cost is ice and diesel fuel.

Table 4

Average variable costs of seine purse catch at Kendari PPS

<i>Variable costs</i>	<i>Before Moratorium</i>			<i>After Moratorium</i>		
	<i>Volume</i>	<i>Price (USD)</i>	<i>Total (USD)</i>	<i>Volume</i>	<i>Price (USD)</i>	<i>Total (USD)</i>
Solar (liters)	1,100	0.37	407	1,000	0.59	590
Oil (kg)	44	2.76	121.44	43	2.76	118.68
Gas (kg)	43	1.38	59.34	43	1.38	59.34
Ice (block)	320	1.52	486.4	320	1.52	486.4
Air (liters)	1,065	0.21	223.65	995	0.21	208.95
Accommodation (package)	1	181.03	181.03	1	205.17	205.17
Salary (people)	19	103.45	1,965.55	19	136.21	2587.99
TVC per trip			3,444			4,257
TVC per year	Trip	36	123,984	Trip	36	153,252

Production and income. The production of purse seine fishing boats at Kendari PPS is in the species of pelagic fish such as *layang* (*Decapterus* sp.), tuna (*Thunnus* sp.), skipjack (*Katsuwonus pelamis*) and yellowfin tuna (*Thunnus albacares*) which are ready for sale both domestically and abroad. Tuna are found throughout the world except the Arctic Ocean (Olson & Boggs 1986). Income analysis is carried out in a cross section. Before the Moratorium, the results obtained in one catch varied between 3,500 and 6,100 kg (for 7-10 days on the sea) so that in a year the catch was obtained as many as 126,000-219,000 kg or an average of 170,460 kg within a production value of USD 141,070.34 obtained income USD 18,515.08 after deducting total cost of USD 122,555.27.

After the Moratorium, the results obtained in one catch varied between 158,400 and 360,000 kg or an average of 247,590 kg per year within less than 7 days with a production value of USD 310,768.14, the income was obtained USD 158,398.04 after subtracting with total costs of USD 152,370.09 or there is an increase to 11.67 percent. In addition, the RC ratio increased from 1.15 to 2.04. It means that this business will have a positive impact on the income of mini purse seine fishermen and become more decent after the Moratorium policy. The increase of income will also have an impact on the ability of fishermen to deal with business risks and have got improvement to their social status (Fausayana et al 2017, 2018). Production and income of fishermen can be seen in Table 5.

Table 5

Production and business income of purse seine fishing boats at Kendari PPS

<i>Before Moratorium</i>		<i>After Moratorium</i>	
Production (kg)	170,460	Production (kg)	247,590
Price (USD)	0.83	Price (USD)	1.26
Total revenue cost	141,481.80	Total revenue cost	311,963.40
Fixed cost	142.97	Fixed cost	142.97
Variable cost	123,999	Variable cost	153,235
Total cost	124,141.74	Total cost	153,378
Income	17,340.06	Income	158,585.34
RC ratio	1.14	RC ratio	2.03

The marketing process of purse seine fishery products is through export and domestic marketing. The raw material for fishery products originating from fishermen's catches is processed through cleaning and packaging then accommodating it in cold storage. After the raw materials have been fulfilled properly with product capacity then export marketing is carried out to other countries such as Thailand, Germany, Japan and the USA and to domestic markets such as Surabaya, Jakarta, Semarang and Makassar. Through easy marketing access, management of shipping documents becomes faster. Therefore, fisheries investors do not have to spend a lot of cost for delivery.

In case of composition impact at PPS Kendari, the size of boats > 30 GT have a very significant impact. The Moratorium policy issued by the Ministry of Maritime Affairs and Fisheries seems to provide hope for fishermen at PPS Kendari. Based on interviews with fishermen, this policy makes them easier to get fish because the amount of fish stocks in the waters around the coast is abundant. In the past (before the Moratorium), the fishermen had to go out to sea for more than 7 days to get an adequate catch with a farther fishing ground than now. After the Moratorium, fishermen have to sail for only 2-3 nights to get abundant yields so operational costs, especially for fuel and sailing supplies can be reduced.

Another point, fishermen's bargaining position towards fish prices has increased. It can be seen from the price of fish that it has increased especially for certain types of fish which are industrial commodities. This is a blessing for them because they can take benefit beyond the usual conditions. On the other hand, fishing boats can enter the port area and park at the dock easily since the large ships (61-100 GT) are not operated. This situation has been occurred a few decades ago. Now, fishermen get benefit by this policy. They hope it will continue consistently and alignments to fishermen will become a priority.

Conclusions. The post-Moratorium policy has an impact in increasing fishermen income and business feasibility of purse seine catching boats > 30 GT in comparison with the period before the Moratorium. This increase is occurred in the amount of production (through a Moratorium policy, it is easier for fishermen to get fish because the amount of fish stocks in the waters around the coast become abundant), selling prices, variable costs savings and improvement of fishermen's bargaining position towards the price of fish. This is reflected in the price of fish that has increased especially for certain types of fish which are industrial commodities. It is expected that this policy will continue consistently and alignments with fishermen will become a priority.

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