



# The perceptions and aspirations of purse seine fishermen toward the prohibition of 'cantrang' (Danish seine) in Bajomulyo, Pati Regency-Indonesia

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**Abstract.** Our research objective was to explore the perceptions and aspirations of purse seine fishermen toward the prohibition of 'cantrang' (Danish seine) in Bajomulyo, Pati Regency. We used a case study with descriptive analysis. We collected data, including primary and secondary data. Primary data were obtained by several data collection techniques, namely indepth interviews, focus group discussion and observation at the research site. Secondary data were obtained from agency of fish landing place in Bajomulyo and Department of Maritime Affairs and Fisheries of Pati Regency. Data analysis were including economic and social aspects of fishermen in 2016-2018. This research showed that on economic aspects including the number of catches, income, profits, investment cost, operational costs and the number of crew had increased. In the social aspect, there was no significant negative impact between purse seine fishermen with local community. The aspiration of purse seine fishermen expected the assistance program provided by the government in the transition of the use of Danish seine to purse seine fishing gear.

**Key Words:** Bajomulyo-Pati Regency, Danish seine ban, purse seine, social-economic.

**Introduction.** Pati Regency is one of the regencies in Central Java Province that relies on the fisheries sector, especially capture fisheries as a source of regional income. Coastal Fishing Port of Bajomulyo is center of fisheries activity in Pati Regency. The various fishing gears in the Coastal Fishing Port of Bajomulyo are gillnet, bottom long line, Danish seine ('cantrang') and purse seine (Dewi 2016). The Government through the Ministry of Maritime Affairs and Fisheries (MMAF) issued a Regulation of MMAF Minister number 2 of 2015 concerning the prohibition of trawl and seine nets (including Danish seine). This policy makes the owners of fishing vessels with fishing gear of Danish seine must replace their fishing gear. Some Danish seine fishermen from various regions have changed to environmentally friendly fishing gear (EFFG).

In 2016, several Danish seine vessels with sizes above 30 GT in Pati Regency have replaced fishing gear to 'Rawai' (bottom long line), gillnet and purse seine. In Bajomulyo Coastal Fishing Port, purse seine ships over 30 GT are quite dominant in number, which is expected to replace prohibited Danish seine vessels. The problem in this study is about the perception and aspiration of purse seine fishermen with the transition from Danish seine vessels fishing gear to purse seine.

The purpose of this study was to explore the perceptions and aspirations of purse seine fishermen toward the prohibition of Danish seine. Perceptions were studied in economic aspects which included investment costs, cost of fishing gear, number of laborers, catch yield, income and profits. Perceptions in social aspects included issues of conflict, tradition or culture and perceptions of the fishing rules in the sea.

## Material and Method

**Research location.** This research site was Coastal Fishing Port of Bajomulyo, Pati Regency (Figure 1). Coastal Fishing Port of Bajomulyo is located on Juwana river, being the center of industrial fisheries in Pati Regency.

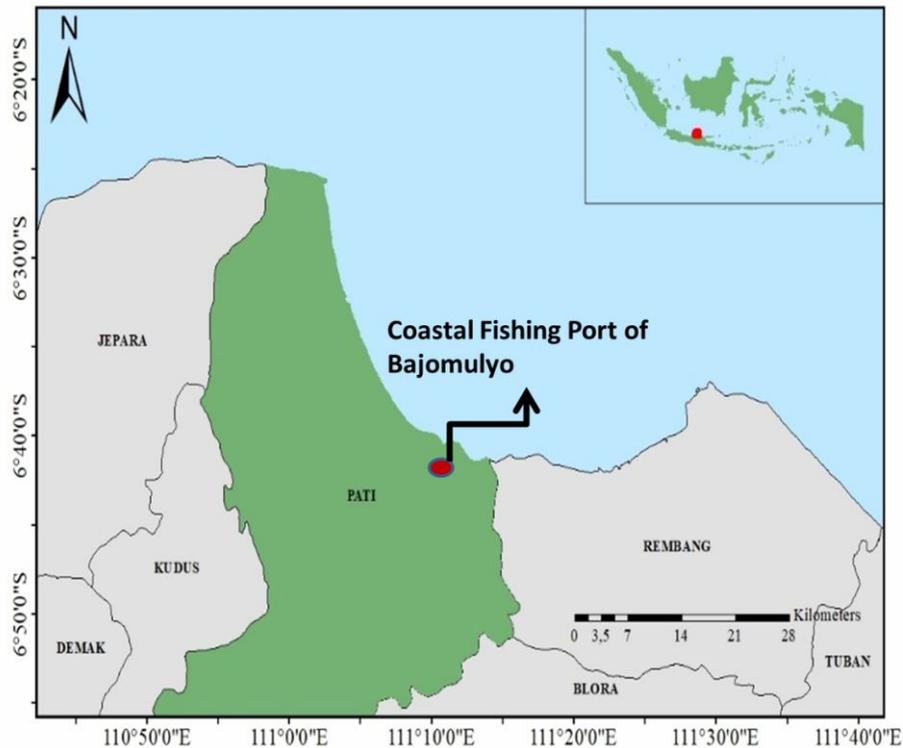


Figure 1. Research location.

**Data collection.** The research data collection included primary and secondary data. Primary data were obtained by several data collection techniques, including indepth interviews, Focus Group Discussion and observation at the study site. The number of respondents in this research were 40 fishermen of purse seine, 3 persons of Bajomulyo fishing port official and 1 person of official from Fisheries Department of Pati Regency. Secondary data were obtained from fish landing place of Bajomulyo and the Department of Maritime Affairs and Fisheries of Pati Regency. Data analysis covers an economic and social aspects of fishermen in 2016 to 2018.

**Data analysis.** This research used a case study with quantitative descriptive analysis. Data analysis were including economic and social aspects of fishermen in 2016-2018. In economic aspects, this research included the number of catches, income, profits, investment cost, operational costs and the number of crews. In social aspect, this research included social conflict, social process and fishermen involvement in public policy making.

**Results and Discussion.** Coastal Fishing Port of Bajomulyo is administratively part of Juwana sub-regency. Coastal Fishing Port of Bajomulyo is fishing base for many industrial fishing vessels with vessel size more than 30 GT (gross tonnage) and fishing time more than 1 month per trip. The fishing vessels that have fishing base in Coastal Fishing Port of Bajomulyo are dominated by Danish seine and purse seine vessels.

**Production value.** Fish production as the result of fishing can be auctioned at the Coastal Fishing Port of Bajomulyo. The peak season occurs in May, September and

November with a total production of 23,168,109 kg in 2018. Table 1 shows that the value of fish production in Coastal Fishing Port of Bajomulyo was IDR. 238 billion in 2018.

Table 1

Fish production in Coastal Fishing Port of Bajomulyo in 2018

<i>Months</i>	<i>Production (kg)</i>	<i>Economic value (IDR)</i>
January	902,590	11,687,910,000
February	893,148	14,791,110,000
March	2,278,927	20,813,015,000
April	1,713,649	18,817,800,000
May	3,177,425	35,638,910,000
June	1,894,417	15,857,240,000
July	562,806	7,088,620,000
August	1,904,457	16,737,580,000
September	2,752,197	26,669,790,000
October	2,532,787	26,314,310,000
November	2,769,170	26,450,460,000
December	1,786,536	17,390,510,000
<b>Total</b>	<b>23,168,109</b>	<b>238,257,255,000</b>

Source: DKP Kabupaten Pati (2018).

**The number of ships and fishing gears.** The fishing ships that landed at Bajomulyo Coastal Fishing Port are not entirely from Pati Regency but also from other regions namely Rembang Regency and Batang Regency. Number of fishing ships base of fishing gears that have fishing base at Bajomulyo Coastal Fishing Port can be seen in Table 2.

Table 2

Number of ships base on fishing gear types in 2018

<i>Type of fishing gears</i>	<i>Number</i>
Stick held dip net	12
Danish seine	109
Cast net	62
Oceanic gill net	18
Stingray gill net	1
Mini purse seine	4
Large pelagic purse seine	23
Small pelagic purse seine	332
Bottom longline	88
<b>Total</b>	<b>649</b>

Source: DKP Kabupaten Pati (2018).

Purse seine is the most dominant fishing gear in Bajomulyo Coastal Fishing Port, which is 62% of total fishing gears (Prasetyo et al 2016). Danish seine vessels that have switched to purse seine vessels are large-sized purse seine. In 2019, the number of Danish seine vessels that turned into purse seine was 12 unit. Purse seine vessels that have fishing base at Bajomulyo Coastal Fishing Port have size of 90-95 GT. Their material uses wood. In general, the type of wood be used is teak (*Tectona grandis*). According to Utomo et al (2013), the number of crew in purse seine operations is quite large, around 30-40 people. Fish catches of purse seine include *Selaroides* sp., *Sardinella gibbosa*, *Decapterus* spp., *Rastrelliger* spp., *Sardinella* spp., *Auxis* sp. and *Scomberomorus* sp. The average number of catches per season in a year fluctuates. According to Metusalach et al (2014), the types of dominant fish caught with purse seine in fisheries management area of 718 (around of Aru Sea) are small pelagic fish and large pelagic fish. In the peak season, the number of fish caught during the season reaches 151,800 kg. While the total of fish

caught in moderate season is 77,280 kg and in the famine season only 46,920 kg (Table 3).

Table 3

The average production of purse seine per unit (2018)

Species	Type of seasons			Total
	Peak	Moderate	Famine	
<i>Selaroides</i> sp.	33,396	17,002	10,322	60,720
<i>Sardinella gibbosa</i>	30,360	15,456	9,384	55,200
<i>Decapterus</i> spp.	28,842	14,683	8,915	52,440
<i>Rastrelliger</i> spp.	25,806	13,138	7,976	46,920
<i>Sardinella</i> spp.	21,252	10,819	6,569	38,640
<i>Auxis</i> sp.	9,108	4,637	2,815	16,560
<i>Scomberomorus</i> sp.	3,036	1,546	938	5,520
Total (kg)	151,800	77,281	46,919	276,000

Note: base on data survey.

The average productivity of purse seine is 276,000 kg per unit per year. One fishing vessel can produce 34,500 kg of fish per trip. While the productivity per fisherman is 1,380 kg per person. The fishing ground of purse seine that has fishing base in Bajomulyo Coastal Fishing Port is located south of Aru Sea until the eastern of Timor Sea. They use fishing gear that is usually operated at a depth of more than 60 meters. If there are not many fish in that location, fishing operations are usually carried out in the southern of Jamdena Island. The fish caught are brought to Dobo port or Tual port and then transported by collecting vessels to be brought to Juwana sub-regency. Purse seine fishermen in Bajomulyo coastal fishing port including ex-fishermen of Danish seine. The fishing ground is included in the fisheries area management of 718 which take 6 to 8 months in 1 year. Based on interviews with purse seine fishermen, there are three fishing seasons in a year, namely peak season, moderate season and famine. The peak season occurs in November to February, the moderate season is in July to October and the famine season occurs in March to June.

**The economic aspects.** The results of the interviews showed that there has been an increase in profits of purse seine fisheries in the last three years. The increase in profits will support the sustainability of purse seine capture fisheries as a substitute for Danish seine (Table 4).

Table 4

Profits, production and fish price

Year	Profit		Production per year		Average fish price	
	IDR per unit	Increase (%)	Kg	Increase (%)	IDR per kg	Increase (%)
2016	1,490,000,000	-	369,000	-	18,000	-
2017	1,550,000,000	1.04	380,000	1.03	19,000	1.06
2018	1,661,000,000	1.07	392,000	1.03	22,000	1.16

Base on interview, the profit of purse seine from 2016 to 2018 tends to increase. This fishing activities increased of 1.04% in profits from IDR 1,490,000,000 in 2016 to IDR 1,550,000,000 in 2017 and increased again by 1.07% in 2018. In fishermen's perception, the increase in profits was caused by fishermen who are trying to increase their catches by looking for potential fishing ground. Experience in searching for new fishing ground can also increase catches and profits.

The fish production during 2016 to 2018 also increased, i.e. 1.03% from 369,000 kg (2016) to 380,000 (2017) and catches increased again by 1.16% to 392,000 kg in 2018. In fishermen's perception, addition of crew in fishing operations can increase

production. If fishing vessel has an inadequate crew member, it certainly interferes with the fishing operations. So the right number of crew member will further facilitate fishing operations and have an impact on increasing catches.

The price of fish had increased by 1.06% from IDR 18,000 per kg (2016) to IDR 19,000 per kg (2017) and increased again by 1.16% to IDR 22,000 per kg in 2018. The increase in the price of fish due to the ship has been equipped with a freezer engine to store the catch. Good quality fish causes the selling price of fish to be relatively high. According to Metusalach et al (2014), quality degradation and high post-harvest damage were caused by poor fishing methods, poor handling methods, long supply chains, and inadequate handling facilities. The methods of fishing and handling on board are very influential on the quality and freshness of fish. Huss (1995) stated that very often ignorance and lack of skills in handling fish is a source of fish damage.

Investment cost also shown an increase. But purse seine fishermen expect to increase their income by expanding their fishing business. Several fishermen increase their investment by buying fishing gear, freezer machines and supporting machines. According to Prabowo et al (2012), the biggest investment cost in fisheries business is ship procurement. The investment cost for ship procurement reaches around 60% of the total investment cost.

The operation cost of fishing also tend to increase (Table 5). The increase in fishing operation costs is due to the increasingly distant fishing ground, which affects the need for fuel, food, and fresh water. The biggest component of fishing operation costs is cost of fuel, which is around 75% of the total operational costs. In general, both modern fishermen and traditional fishermen, most of the operational costs is fuel cost (Prabowo et al 2012). An increase fuel consumption by 1.02% from 138,000 liters per year (2016) to 140,000 liters per year (2017) and increased again by 1.05% to 144,000 liters per year in 2018. The fishermen continue to search for potential fishing grounds to increase their production. The number of crews per unit of purse seine tends to increase. The average number of crew increased from 35 persons (2016) to 37 persons (2017) and increased to 40 persons (2018).

Table 5  
The fuel cost and number of crews

Year	Fuel cost		Crew	
	IDR	Increase (%)	Persons	Increase (%)
2016	1,340,000,000	-	35	-
2017	1,370,000,000	1.02	37	1.06
2018	1,440,000,000	1.05	40	1.08

Table 6 shows that fishermen income has increased. The increase in income is due to production and fish prices. To increase their production, fishermen look for fishing ground that more long distant from fishing port.

Table 6  
The fishermen income

Year	Income	
	IDR	Increase (%)
2016	8,050,000,000	-
2017	8,320,000,000	1.03
2018	9,016,000,000	1.08

**The social aspects.** Fishermen's perception of their involvement in the policy making by the government are focused on the question of whether fishermen are involved in making decisions in the management of fishing business in the prohibition of Danish seine and its replacement. The intensity of fishermen involvement in fisheries management will

have a good impact on the sustainability of fishing business management. According to Marpaung (2016), communication is important to make the better perception of communities, then the perception influence to supporting of people toward government program.

Based on interviews with fishermen who use purse seine stated that they have been involved in making decisions related to the replacement program for Danish seine. In 2015, fishermen were given socialization about replacement of Danish seine about 5 times.

There is a conflict about the number of fishing effort. Danish seine has been shown to cause negative externalities to other fishing gears (Wijayanto et al 2019a; Wijayanto et al 2019b). In general, the sustainability of fisheries business requires a conducive situation with low conflict intensity. Based on interviews, there were two conflicts, including fishing ground competition. In the cultural aspect, this research focused on culture impact to local communities. There are many social processes between purse seine fishermen from Java island and local communities. Based on interviews, there is no negative impact in social aspect that have significant impact to the sustainability of the fishing business.

***The aspiration of purse seine fishermen.*** The aspiration of purse seine fishermen about fish marketing distribution is that Indonesia government makes fish distribution more easier and faster. The existing distribution channels are from Tual or Dobo port to Surabaya City and finally dismantled in Juwana Sub-Regency. The Indonesian government recommends that fishermen distribute their catch via 'sea-toll' vessels. According to Andilas (2017), the 'sea-toll' is one of the Indonesian government's programs that aims to reduce price disparities that occur between Western Indonesia (especially Java) and Eastern Indonesia by utilizing sea transportation.

Fish caught by fishermen are loaded in refrigerated containers. Ships full of catches are immediately loaded on the 'sea-toll' ship. 'Sea-toll' vessels have a very large capacity compared to conventional collection vessels. So, it takes quite a long time for the 'sea-toll' ship to leave for Surabaya. Therefore, fish are stored for too long time on 'sea-toll' ship and this can reduce the quality of fish.

The role of seaports as a driving force for the marine economy is undoubtedly, with the acquisition of economic benefits that can be drawn from the existence of seaports. However, in reality there are still a number of obstacles, including efficiency and productivity of goods that pass through the seaport is still very low due to the lack of supporting infrastructure, such as shelter (both permanent and temporary), unloading time that has not been effective yet and convoluted bureaucracy (Adam 2015). The 'sea-toll', that the port is visited by freight transportation, is still not optimal. This 'sea-toll' has not yet give impact on price disparities in 'disadvantaged, remote, outer and border areas'. This is due to constraints of shipping conditions that take a long time, limited land transportation and imbalanced supply.

All respondents who have changed Danish seine to purse seine are already skilled in operating the gear. According to Purwasih (2016), the success of fishing operations is influenced by many factors including fishing gear, boats, supporting devices and the human resources that operate it. Reliable human resources are very necessary in the fishing operation. Accuracy in determining fishing ground and management skills activities on board is very important. According to Lukman (2013) one of the success factors in the operation of fishing gear is influenced by the level of technology and the ability of fishermen (skill). All fishermen respondents who have changed fishing gear to longline, gillnet and purse seine also expect additional fishing areas not only in the fisheries management area of 718. This is because there have been conflicts between gillnet and longline operation at one location.

**Conclusions.** This research explore the characteristic of purse seine fisheries business in Pati Regency which replacing Danish seine ban by Indonesian government, including the production, income, profits, investment, operational costs and the number of crews that has increased in the last three years. In social aspect, there were insignificant negative

impacts between purse seine fishermen with local community. Purse seine fishermen that have fishing base in Bajomulyo Coastal Fishing Port expect the assistance program provided by the Indonesian government in the replacement transition process from Danish seine to purse seine.

Further research is needed on alternative adaptation strategies for other fishing gears during bad weather and famine season. There is a need for the participation of stakeholders in the provision of capital assistance and management of fishing business in Danish seine substitution.

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