Excellent Commodity of Capture Fisheries and Preservation of Fish Resources in Pekalongan City

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Abstract. Pekalongan City is a coastal area on the north coast of Central Java Province, which has a fairly large fishing port, namely Pekalongan Archipelago Fishery Port. This research objective to determine the excellent commodities of capture fisheries and efforts to preserve capture fisheries resources. Descriptive research methods have been used in this research. The data taken is secondary data from literature studies and related institutions, because the time of the research was still in the Covid 19 pandemic. Analysis of the data used is quantitative descriptive analysis. The research results showed that the dominant fishing gear was Purse seine and Gillnet. Purse seine vessels used are mini purse seine (<30GT) and pursein (> 30GT). Excellent commodity include *Layang* (*Decapterus sp*), Tonngkol (*Thunnus tonggol*) and *Tembang* (*Sardinella fimbriata*). Efforts to preserve fish resources in the City of Pekalongan are done by regulating the number of fishing gear and limiting the number of production and the number of fishing trips. The government policies in the effort to maintain the sustainability of fish resources include: banning the use of trawl and seine net, determination of Fisheries Management Areas (*WPP*) and limitation on the amount of catches allowed (*JTB*), as well as establishing fishing lanes.

Keywords: Pekalongan City, Excellent commodity, Capture Fisheries.

1 Introduction

One of the cities in Central Java which is the center of fishery activities is Pekalongan City. Pekalongan City is located on the north coast of Central Java Province with an area of 45.25 km² consisting of 4 (four) districts, namely North Pekalongan, South Pekalongan, East Pekalongan, and West Pekalongan. The city is known for its potential and capture fisheries products and has a type B port, the Pekalongan Archipelago Fishery Port /PPNP [1,2,3]. The large potential and production of marine fisheries has a good influence on the economic development of fisheries in Pekalongan City and surrounding areas. Capture fisheries production or in this case is sea fish, in 2019 as many as 13,490,107 tons showed an increase in production compared to the previous year, which was a number of 12,815.64 tons. The types of fish caught in the city of Pekalongan are pelagic fish and demersal fish. [12,13]

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By maximizing activities in the superior fisheries sector, it can increase the success of fisheries development that has been achieved in the previous year. To increase economic growth is to determine the excellent commodities which are the economic driving sector of the city, so that the determination of superior commodities for fisheries is the first step for the region to create economic growth [18,32]. In an effort to realize the economic growth of fisheries in this region, the focus of this study aims to determine the leading commodity of fisheries in Pekalongan City and its preservation.

Excellent commodity is researched using quantitative and qualitative analysis based on the number and types of fish caught, as well as the number and types of fishing gear in Pekalongan City.

2 Research Objective and Location

This study aims to determine the leading commodities of capture fisheries and efforts to preserve capture fisheries resources in the city of Pekalongan

2.1 Data Collection.

The data is taken is secondary data from literature studies and related institutions, because the time of the research was still in the corona virus / Covit 19 pandemic. Data collection includes data on the production of fish caught at sea, the value of fish production, fish production per month and the number of fishermen and the number of fishing fleets. The data was taken from various sources, among others, from the Pekalongan City Fisheries Statistics book, Statistics of Central Java fisheries, the Annual Report of the Archipelago Fisheries Port, Bappeda, Central Java Marine and Fisheries Profiles, and from journals related to the analysis of fisheries excellent commodity.

Fig.1. Map of Pekalongan City. PPN Pekalongan

2.2 Data analysis

Data analysis were including data on the production of fish caught at sea, the value of fish production, production per type of fish and the fishing fleet 2015-2018. The analysis of the sustainability of fish resources in this study includes: Efforts by the government to protect fish resources in Pekalongan City and government policies in efforts to maintain the sustainability of marine fishery resources.

3 Result and Discussion

Pekalongan City is located in the lowlands of the north coast of Central Java, having an area of 4,525 km². This city is a lowland that does not have a steep area with an average height of 1 meter above sea level. Pekalongan City has a coastline of around 6.15 km which is the basis of capture fisheries activities. Administratively, the area of the city of Pekalongan lies between 109 ° 37 '55 "up to 109 ° 42 '19" East and 06 ° 50 '42 "up to 06 ° 55 '44" LS. [4,5]. The Pekalongan city area has a fairly large port (class B), namely the Pekalongan Archipelago Fisheries Port (PPN) in the northern part of the city of Pekalongan. This port faces the Java sea, making it easier to use marine fisheries resources in the Java Sea. The distance between Pekalongan City and the capital of Central Java Province (Semarang) is 101 km and has a distance of 384 km from the capital of the Republic of Indonesia (Jakarta)

3.1 Fish production in Pekalongan City

The volume of fish landings at the Pekalongan Archipelago Fisheries Port (PPN) in 2018 reached 12,815,639.89 kg with a production value of Rp.199,088,760,603.45, - Compared to a year ago a decline in production of 0.25% was accompanied by a decrease in production value of 3.81%. The average fish production landed every day is around 35.11 tons with an average price of Rp. 15,534.82/kg or in other words the average price decreased 3.57% compared to last year. In 2018 is the year of the Weak La Nina condition which causes uneven rainfall in every region of Indonesia. Uneven and not too high rainfall conditions affect the number of ships that go to sea, especially for vessels under 30 GT. Weak La Nina conditions cause little rainfall so that the sun lasts longer to support the availability of plankton at sea and increase salinity. In 2018, many fish landed from the Gill Circle ring. Where the average normal landing between 2 to 4 tons in 2018 the number of landings reached 7 to 9 tons / trip. With more and more ships using freezers, the quality of landed fish is better. Fish that have better quality, will affect the price of fish which is getting higher too. Catching time using a freezing device can be longer at sea, whereas those who use ice when the ice runs out will immediately land the fish [7,8,9]

Based on Fig.2, the production and production value of capture fisheries products in Pekalongan city from year to year fluctuates every year. The fluctuating amount of production is presumably due to the influence of the fish season and also the influence of the number of fleets that landed their fish at the Pekalongan Archipelago Fishery Port (PPNP). From Fig. 3 shows that the production per month is quite a lot in the months between July to December

Fig. 2. Production and production value of fish catches (Pekalongan Archipelago Fisheries Port, 2019)

3.2 Fishing Season

The fishing season at the Pekalongan Archipelago Fisheries Port ranges from June to October because in those months there is an increase in production or peak season when compared to other months. The transition season is divided into two, namely the initial transition that occurs in March to June and the final transition in October to November. During this transition month fishermen usually start fishing operations (Graph 2). At the moment in the Pekalongan Archipelago Fisheries Port, many ships come from outside the area, especially purse seine ships from East Java. Pekalongan serves as a base for fishing on the north coast of Central Java [10,11,27].

Fig. 3. Production of fish catches (tons) per month (tons) in 2018 (Pekalongan Archipelago Fisheries Port, 2019)

The fish landing season in PPN Pekalongan is divided into two groups. Famine (not fish) season is common in the first (1) and third (3) quarters while in the second (2) and fourth (4) quarters is the peak of fish landing. But in 2018 there seems to be a shift in the fish season.

During 2018 the influence of the Weak La Nina season occurred due to erratic rainfall and the influence of the Cempaka storm which affected the fishing conditions with high wave conditions which forced fishermen not to go to sea. In addition, the change of the west and east monsoons which is longer than usual causes high waves and strong currents that cause the ship to be unable to operate. The existence of Weak La Nina's condition affects the salinity or salt content of the sea and the amount of sunlight received by the sea. Poor salt content and lighting conditions will affect the availability of plankton as fish food. Less fertile areas cause the fish population is also small. Landed fish are dominated by small pelagic fish.

3.3 Fishing Ground

Most of the purse seine fishing areas in the Nusantara Pekalongan Fishery Port are WPP 711 and WPP 713 or precisely in the Masalembo and Matasiri areas (Makassar Strait). It is also in Lumu-lumu and Bawean waters and the South China Sea. The fishing area which is far away makes the trip range between 40-136 days. Likewise, supplies must be prepared for each sea-going distance taken from the fishing base to the fishing ground as far as 25 - 40 nautical miles with a travel time of approximately 5-6 hours. The determination of the fishing area is determined by the fishing master using the experience he has, taking into account the current, temperature, wind and wave conditions. Determination of the capture area is usually based on the area that has been tagged on the GPS aids found on the ship.

In 2018 the fishing vessels were mostly in WPP 712 with 97.07%, WPP 713 as many as 2.52%, WPP 572 as many as 0.32% and WPP 573 as many as 0.09% of the total number of ships operating as many as 5,596 units. Vessels operating on WPP 713, 572, 573 days at sea range from 50 days to 90 days and are dominated by ships measuring> 30 GT with Purse Seine fishing gear, while ships operating on WPP 712 operating days range from 3 days to / d 15 days and carried out by ships measuring <30 GT dominated by ships Purse Seine and Bottom Gill Net.

3.4 Fishing Fleet

Fishing fleet is one of the main supporting factors in fishing activities at sea and affects the catch. The size of the boat used by fishermen determines the size of the catch because it is related to the length of the fishing trip and the carrying capacity of the boat. The size of the boat used by fishermen determines the size of the catch because it is related to the length of the fishing trip and the carrying capacity of the boat.

Table 1. Number of fishing fleet.

Tahun	<10 GT	10-30 GT	30-50GT	50-100GT	100-200 GT	Total
2015	82	116	42	125	69	434
2016	39	126	8	98	31	302
2017	214	112	3	71	10	410
2018	69	74	42	75	41	301

Source : Fisheries Statistic Pekalongan City, 2019

The fishing fleet at Pekalongan PPN is dominated by large purse seine vessels (> 30GT) and mini purse seine (<30 GT). The number of crew members who assist arrest operations is 20-40 people per trip. Ship engine power between 250-350 pk for large purse seine. As for the storage of captured fish, it uses the Refrigerated Sea Water (RSW) system. So that the catch is stored frozen. The arrest also used assistive devices in the form of lights and FADs which were not permanent.

3.5 Fishing gear

The types of fishing gear used by fishermen in Pekalongan City are varied, such as Purse seine, Payang, Cantrang, Arad, Fishing Line, Trammel net, Gill net, and others. Catches that can depend on the type of fishing gear used. The following number of fishing gear in the city of Pekalongan are as follows [20,21,222,27]:

Table 2. Number of fishing gears in Pekalongan City

Years	Purse Seine >30 GT	Purse Seine <30 GT	Set Gill Net	Encircling Gill Net	Danish Seine	Trap
2015	198	146	25	0	0	0
2016	133	111	47	0	0	0
2017	84	91	48	23	56	31
2018	74	42	48	25	42	66

Source : Fisheries Statistic Pekalongan City, 2019

The most widely available fishing gear at the Pekalongan Archipelago Fishery Port is purse seine. Purse seine fishing gear is a fishing gear that produces the largest production of other fishing gear at the Pekalongan Archipelago Fisheries Port. The catch of purse seine fishing gear is dominated by small pelagic fish. The number of purse seine fishing gear has decreased due to the decrease in the number of fishermen who operate these fishing gear due to changing their livelihoods or moving residence. The number of gillnet fishing gear has increased every year. The gill nets found in Pekalongan consist of gill nets on the surface and drift gills. Gillnet is designed to catch pelagic fish, with the main catch of Gillnet being tuna (Thunnuss cob) and mackerel (Scomberomorus commersoni) [22].

3.6 Type of Fish Catches

Of the types of fish landed 95.07% were pelagic fish and the remaining 4.93% were demersal fish. Of the total pelagic fish, Lemuru Jawa, Tembang Fish, Fly Fish and Mackerel and large pelagic fish such as Setuhuk, Tuna and the like. Demersal fish species commonly caught are Red Snapper, Shark, Side Fish and there are also some large pelagic fish such as White Setuhuk, Sailing Fish and Gray Cobs. Pelagic fish are generally caught with the Trawl Ring fishing gear, while most of the large pelagic fish are caught with the Gill Circle fishing gear. Demersal fish species are generally caught by Fixed Gill Nets [23,27].

3.7 Fisherman

Most of the coastal communities in the city of Pekalongan mainly work as fishermen and rarely do fishermen have side jobs. Fishermen who carry out activities in Pekalongan PPN apart from Pekalongan City, there are also fishermen from Rembang, Demak, Pemalang and Tegal and from Tuban (East Java). Generally they use the Mini Purse Seine ship which is operated during the dark moon and the west wind season. This has a pretty good impact on the communities around Pekalongan VAT in particular and Pekalongan City in general, especially in the economic and employment fields [21,25,26].

The number of fishermen in the city of Pekalongan is presented in Graph 3. Based on Fig. 3, it shows that the number of fishermen is decreasing from year to year, this is allegedly due to the prohibition of fishing using fishing equipment that is not environmentally friendly, such as beam trawl and denish saine [20,21,24].

Fig. 3. Total Number of Fishermen in Pekalongan City, 2015-2018 (Fisheries Statistic Pekalongan City, 2019)

4 Excelent Commodity

Excellent commodities that can be a driving force for the development of an area include: Excellent commodities capable of absorbing labor; can last for a certain period of time; must get various forms of support; and oriented towards the preservation of resources and the environment [18,19]. When viewed from the point of view of the type of fishing gear that is the most numerous and most productive in the City of Pekalongan is the purse seine fishing gear, both large pusrsein and mini pursein and Gillnet [21,27].

Table 3. Fish production in Pekalongan city 2015-2019

No	Type of Fish	Production				
		2015	2016	2017	2018	2019
1	Bawal hitam	204,1	321,4	152	84,5	90,60
2	Cumi - cumi	180,7	124,9	175,7	166,6	174,30
3	Kembung	1399,1	1465,1	955	1002,9	1.100,70
4	Layang	8293,2	7487,6	3430,5	4287,1	4.897,80
5	Layur/Jogor	59,7	65,8	68,7	65,3	76,30
6	Selar	2720,7	3272,8	2360,3	2306,2	2.400,00
7	Tembang/Jui	1167,7	2209,4	1240,2	936,2	973,20
8	Tenggiri	99,5	107,9	130,1	70,9	82,30
9	Cucut	64,6	48,3	6	35,5	56,70
10	Petek / Peperek	28,4	23,6	67,9	50,7	64,20
11	Manyung	62	39,4	49,7	126,5	137,80
12	Pari Kikir	2,6	0,1	0,5	7,5	6,00
13	Tongkol	2021,8	2473,3	2382,5	2649,7	2.703,40

In Pekalongan PPN is dominated by purse seine > 30 GT fishing gear with 50-90 days fishing time and operating in WPP 711 and WPP 713, so fishermen use freezers to store fish in the hold. Mini purse seine <30 GT fishing gear catches for 3-15 days in WPP 712. Purse seine fishing gear has the highest catch followed by mini purse seine and gill net.

When viewed from the type and amount of fish caught in the City of Pekalongan (Table 3), it shows that the Layang fish (*Decapterus* sp), Tuna fish, *Selarides* (*Selaroides* sp), and Mackerel fish (*Rastrelliger* sp) and Tembang / Jui fish (*Sardinella fimbriata*) has a high amount of production.. According to Naya et al 2017 the main commodities of capture fisheries in Central Java Province include floating fish (*Decapterus* sp), mackerel (*Rastrelliger* sp), *selarides* (*Selaroides* sp) and tembang fish (*Sardinella fimbriata*)

When viewed in terms of catch commodity prices, it shows that the Layang fish (*Decapterus* sp), Tuna fish, *Selarides* (*Selaroides* sp), and Mackerel (*Rastrelliger* sp) and Tembang / Jui (*Sardinella fimbriata*) fish respectively are 18.000-35.00, 42.000-80.000, 15.000-25.000, 45.000-55.000 and 10.000-22.000 IDR/kg.

5 Preservation of Fish Resources

Pekalongan City is located in the north coast of Java, so that the fish resources in Pekalongan City are quite abundant and efforts are needed to optimize these fish resources. One of the leading sectors in the City of Pekalongan is the fisheries sector. Sustainability efforts in increasing leading fishery commodity in Pekalongan City are [6,7]:

1. Setting the number of fishing gear
2. Limiting the amount of production per season or per year in order to preserve fish resources.
3. Setting the number of fishing trips
4. Providing counseling to fishermen regarding handling fish on the boat so that the catches obtained when landed are fresh so that the quality of the fish does not go down and the prices obtained are high.

The government policies in an effort to maintain the sustainability of existing fish resources include [10,16,17,28,30,31]:

1. Prohibition of the use of trawl and trawl (seine net) fishing gear.
2. Decree of the Minister of Maritime Affairs and Fisheries No. 06 of 2010 concerning Fishing Equipment in WPPNRI.

3. Determination of potential fish resources and the amount of catch allowed (JTB).
4. Minister of Maritime Affairs and Fisheries Regulation No. 71 of 2016 concerning fishing lanes and the placement of fishing gear.

According to Wijayanto et al (2019a,2019b), in controlling denish seine, through fishing permits, the government has limited the tonnage and number of ships but does not regulate maximum engine power. To manage of capture fisheries from the aspect of fish resource sustainability requires policies such as: (1) conservation and rehabilitation of mangrove forests, (2) regulation and distribution of the number of fishing gear, (3) post-harvest processing, (4) revitalization and modernization of large fleets operating in offshore areas(5) the prohibition and reduction of small fleets that are inefficient and not environmentally friendly, (6) the development of downstream industries in terms of fish processing, (7) management and capacity building of fisheries and marine institutions, (8) diversification and efforts to provide alternative livelihoods, (9) stock enrichment program, (10) intensifying sea patrols to prevent illegal fishing [28].

According to Dian Ayunita et al, 2017, most of the purse seine catches in Pekalongan city are small pelagic fish species, such as floating fish (*Decapterus* sp), layur (*Trichiurus lepturus*), banyar fish (*Rastrelliger kanagurta*), lemuru fish (*Sardinella lemuru*), squid (*Loligo* sp), bentong fish (*Selar crumenophthalmus*), tuna (*Thunnus* sp) and others [17]. According to Rofiqoh et al (2017) the results of the assessment of the level of environmental friendliness of gillnet fishing gear in terms of the weight and the amount of environmentally unfriendly. However, when viewed from the level of utilization of by-products are environmentally friendly[23].

6 Conclusion

Exellent Commodity of capture fisheries in terms of fishing gear shows that the dominant fishing gear is Purse seine and gillnet. Purse seine vessels used are mini purse seine (<30GT) and pursein (> 30GT. Exellent commodity in terms of types of catch fish include Layang (*Decapterus* sp), Tongkol fish, Selar fish (*Selaroides* sp), and mackerel fish (*Rastrelliger* sp) and Tembang / Jui fish (*Sardinella fimbriata*).

Efforts to preserve fish resources in the City of Pekalongan are done by regulating the number of fishing gear and limiting the number of production and the number of fishing trips. The government policies in the effort to maintain the sustainability of fish resources include: banning the use of trawl and seine net, determination of Fisheries Management Areas (*WPP*) and limitation on the amount of catches allowed (*JTB*), as well as establishing fishing lanes

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