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Cantrang Fisheries Performance in Tegal, Central Java, Indonesia

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----------ABSTRACT----------

The fishing vessels using cantrang in Tegal city are known to be increasing, this is marked by the increasing number of production produced and landed at Tegalsari Beach Fisheries Port (BFP). The more number of challenging vessels operating, the influence of these fishing groups will be more dominating the economy of the surrounding community. The purpose of this study was to determine the cantrang fisheries in the Tegalsari region which were reviewed from several aspects such as the number and size of vessels operating, the number of landed fishes caught, the composition of catches, and the productivity of cantrang vessels. The method used in the study is observation and productivity calculation using the CPUE (catch per unit effort) formula. The results showed that there were 831 units of ships which as many as 750 units were cantrang vessels, production were 31.7 million tons in 2016 and in them there were cantrang contributions of 96%. There are two models of cantrang types, namely Manual (storage using ice blocks) and Freezer (frozen system storage). Cantrang's catch is based on Tegalsari's BFP production data where squid are 24%, Kuniran 12%, Kurisi 10%, and followed by other types of fish (goats, yellow tails, bigeye scad etc.).

***KEYWORDS**; - Fishing Gear,Productivity, BFP Tegalsari*

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I. INTRODUCTION

Cantrang is an increasingly conical large pocket-like fishing gear, operated in the bottom of the waters with the target catch of demersal fish. This type of fish has high economic value (Aji *et al*., 2013). The existence of cantrang is claimed by the government that if the fishing gear is operated it can damage the environment as well as other types of trawlers. This is as stated in the Regulation of the Minister of Maritime Affairs and Fisheries No. 2 of 2015 issued on January 9, 2015, that cantrang includes fishing gear which is prohibited because it is considered not environmentally friendly. In connection with this, various regulations and policies have been implemented by the government to handle the cases of fishing gear. Among them is the prohibition plan which will be decided by the fisheries minister of fisheries but in the end in early 2018 the cantrang is allowed to be re-operated on the condition that there is no additional fleet and repeated measurements are carried out.

According to news published by CNN Indonesia stated that a total of 15 fish paste or surimi manufacturers in Java decided to temporarily suspend their factories. This was done following the entry into force of a ban on the use of fishing equipment in the form of cantrang by the Ministry of Maritime Affairs and Fisheries (MMAF) as of January 1, 2017. Chairman of the Indonesian Fisheries Product Processing and Marketing Business Association (AP5I) Budhi Wibowo said, most surimi factories operating in Indonesia took raw materials derived from fish caught using cantrang vessels. According to Budhi the raw material for surimi is small and white flesh fish.

Fisheries in the city of Tegal, especially in BFP Tegalsari, are the ports that serve the most fishery activities, especially fishing activities using cantrang. The number of cantrang vessels dominates the total number of fishing vessels that exist and provides a large contribution to the production of fisheries in BFP Tegalsari. Cantrang ships and cantrang fishermen have a big influence in Tegal city fisheries activities.

II. METHODE

Time and Place

Research is carried out for 3 months starting from February 2018 to August 2018, in Tegal, Central Java. The research was also carried out by joining cantrang fishing activities on two cantrang units that were fishing for one day long trip.

Materials and tools

The materials and tools to be used are as follows:

1) Cantrang ships that operate one day fishing, Tegal Central Java.
2) Cantrang fishing gear, the tool is a type of fishing gear that is active and classified in the type of boat seine fishing gear (Von Brandt, 1984).
3) Stationery, rulers, scales and cameras

Data analysis

The analytical method used by the author in displaying the data obtained is as follows;

1) Cantrang ship performance

The performance data of the cantarng vessels was collected and tabulated based on the fishing vessel cassification according to Regulation of the Minister of Maritime Affairs and Fisheries No. 49 of 2011 Article 5, which explained the authority to issue fishing vessel permits based on vessel tonnage. So that it can be seen the size of the ship that is in the city of Tegal and where the permit is issued.

Comparing the size of cantrang vessels as stated in the Minister of Transportation Regulation Number 8 of 2013 concerning ship measurements, namely:

GT = K x (V1 + V2).....(1)
GT = K x ((Pdek x b x d x f) + (p x b(r) x d (r))

Keterangan :

GT : Gross Tonage
K : Konstanta (0,25)
V1 : Volume of buildings below the deck
V2 : Volume of the building above the deck
F : Coefficient of block 0,7
P : Room length
pdek : Deck length
B : Breadth
b(r) : Breadth Average
D : Depth
d(r) : Depth Average

2) The cantrang API performance

Cantrang can be distinguished based on the data obtained where each fish catcher data such as netting material, slambar rope, buoy, ballast, ris and other rope lengths are collected in table form and then it can be concluded that there are relative differences in each cantarng fish catcher in operate by each ship. With the data, the authors can also predict where fishing groud cantrains are operated by each ship based on the depth of a waters.

3) Performance of catches

Data of catches in the form of fish species caught using cantrang are collected and tabulated and displayed in the form of garfik and shown as a percentage of each catch obtained from the fishing gear of each vessel so that it can be concluded that any type of fish is the dominance cantrang catch, this can be proven by the percentage of each type of fish caught.

4) Cantrang productivity

a) Calculation of CPUE (catch per unit effort) aims to find out the value of catch rate of fishing efforts based on the distribution of catches to effort, (Gunawan, 2004).

The formula used is as follows:.

$$CPUEi = \frac{Ci}{fi} \quad \text{..... (2)}$$

Information :

Ci : 1st catch (ton)
fi : Trip effort
CPUEi : Number of catches catching the i (ton / trip)

III. RESULT VIEW

Cantrang Ship Performance

Cantrang ships in the Tegalsari coastal fishing port in general can be grouped into two types, namely: ships that use ice blocks and ships that use refrigeration machines. Cantrang ships that use ice are generally less than 30 GT in size. MV Mekar Citra, measuring 13 meters long, 1.7 meters deep, and 4.6 meters breath. This ship has a building on a ship with dimensions of 4 meters in length, width (b (r)) 1.8 meters and height (d (r)) 2 meters. This ship is recorded as measuring 6 GT. However, if the MV Mekar Citra size is calculated again using the formula contained in the regulation of the Minister of Transportation Number 8 of 2013 concerning ship measurements as follows.

MV Mekar Citra gross tonage results using the transportation formula are obtained:

$$GT = K \times \{(p_{dek} \times l \times d \times f) + (p \times b_{(r)} \times d_{(r)})\}$$

$$= 0{,}25 \times \{(13 \times 4{,}6 \times 1{,}7 \times 0{,}7) + (4 \times 1{,}8 \times 2)\}$$

$$= 0{,}25 \times \{71.162 + 14{,}4\}$$

$$= 0{,}25 \times 85{,}562$$

$$\mathbf{GT = 21.3905}$$

Cantrang vessels that have cooling machines are generally larger than 30GT. Fisheries Port of Tegalsari Beach is a fishing port that serves fishing vessels with 889 units.

No	Type of ship	Number (unit)	Percentage (%)
1	Cantrang	750	90.25
2	Gill Net	51	6.14
3	Purse Seine	16	1.93
4	Squid Net	13	1.56
5	Bottom Longline	1	0.12
	Jumlah	**831**	**100**

Table 1. Number of vessels in Tegalsari BFP by type

No	Size (GT)	Before verification		After verification	
		Number (unit)	Percentage (%)	Number (unit)	Percentage (%)
1	5-10	35	4.67	35	4.67
2	> 10 – 20	27	3.60	27	3.60
3	>20 – 30	688	91.73	297	39.60
4	>30 – 50	0	0.00	252	33.60
5	>50 – 100	0	0.00	106	14.13
6	>100 – 200	0	0.00	33	4.40
	Total	**750**	**100.00**	**750**	**100.00**

Table 2. Number of cantrang vessels according to size before and after verification

After repeated measurements and verification, it turns out that there are many vessels of different sizes. Before re-measurement in Tegalsari BFP there were no vessels larger than 30GT. However, after repeated measurements there are hundreds of vessels larger than 30 GT.

The performance of cantrang fishing gear

Cantrang which is operated by Tegal fishermen is a fishing gear that is individually assembled, so that for the size of the equipment made it sometimes refers to the wishes of the ship owner. in general, the magnitude of the fishing gear made also adjusts the volume of the vessel and the power of the vessel's crankcase.

Based on field observations and interviews conducted directly with fishermen and cantrang crew members at the Tegalsari coastal fishing port, the results showed that the fishing gear used in particular cantrang had the same shape, but there were differences in the part or size of the material and the overall size of the fishing gear used. This can be seen in the table shown below.

Name of Vessel	Gross Ton (GT)	Selambar Rope		Upper Ris Rope		Lower Ris Rope		Lenght of Webbing (m)
		Lenghat (m)	Matrial	Diameter (cm)	Lenght (m)	Diameter (cm)	Lenght (m)	
Mekar Citra	6	160	marlon	2,5	12	1	12	24
Barokah Abadi	108	400	marlon	3	25	1	25	45
Abimanyu	81	160	marlon	3	20	1	20	36
Dharma bakti	60	500	marlon	3	30	1	30	54
Arga prima	30	220	marlon	3	18	1	18	32
Wandi jaya 3	80	350	marlon	3	25	1	25	45
Yudistira	51	400	marlon	3	20	1	20	36
Serelia	102	800	marlon	3	30	1	30	54
Sumber beras	27	200	marlon	2,5	18	1	18	32
Sumber Barokah Jaya	44	500	marlon	3	26	1	26	47
Segara Jaya	6	250	marlon	2,5	12	1	12	22
Sari Mulya	6	160	marlon	2,5	14	1	14	25
Sumber Urip	120	800	marlon	3	34	1	34	61
Santri kamil	30	400	marlon	3	22	1	22	40
Sari bangun	15	180	marlon	2,5	16	1	16	29
Susriana 2	25	200	marlon	3	24	1	24	43
Roni jaya 2	18	160	marlon	2,5	14	1	14	25
Rizky bahari	27	400	marlon	3	22	1	22	40
Rosalina indah	88	500	marlon	3	24	1	24	43
Putri tunggal	15	300	marlon	2,5	20	1	20	36

Table 3. Cantrang Performance

The table above is data from interviews with fishermen and cantrang crew members at the Tegalsari coastal fishing port, the size of the vessel listed (GT) is the size of the cantrang vessel that has been verified. The data obtained is about the length of the slambar rope (the length of each side) and the material (slambar rope material), the rope diameter rises and the length, the overall length of the net is calculated from the tip of the net until the bag is in a tense position.

From the available data shows that the fishing gear used by cantrang tegal fishermen has different sizes, the size of the vessel affects the size of the fishing gear used. For example the cantrang size used by MV Mekar citra with a volume of 6 GT vessels, which has a net length of 24 meters, a slambar of 160 meters. Unlike the case with the immortal MV Barokah which has a volume of 108 GT vessels, the vessel operates a cantrang with a total net length of 45 meters and has a slambar rope on each side of which is 400 meters. Besides that the size of the material used is also different like the slambar rope, it can be seen that ships that have a size above 30 GT on average use a slambar rope with a diameter of 30 mm, while smaller vessels or under 30 GT use a slambar with a diameter 25 mm. The size of the rope used between the upper and lower rises is different, where the size of the rope used to make the lower rises has a diameter and material according to the slambar rope used, while the size and material used to make the upper rope is a rope with material PE (Polyethelene) with a diameter of 1 cm. So according to the data obtained from the fishermen, it can be seen that the cantrang size used is different, according to the size of the vessel that operates it.

Performance of catches

The catches of cantrang vessels are usually dominated by basic fish species, such as; turmeric, kapasan and other basic fish. As for the composition of the fish caught by MV Mekar citra is as listed in the following table

No	Name of Fish	Scientific Name
1	Spottefined bulleye	*Priacanthus tayenus*
2	Snaper	*Nemipterus* spp
3	Ray-finned fishes	*Scolopsis taenippterus*
4	Starry triggerfish	*Abalistes stellaris*
5	Grouper	*Epinephelinae*
6	Yellow tail fish	*Caesio erythrogaster*
7	Orange spotted filefish	*Oxymonacanthus longirostis*
8	Rabbitfishes	*Siganus* sp.
9	Blotched grunt	*Pamadasys argenteus*
10	Silver biddy	*Gerres abbreviates*
11	Goldbang goatfish	*Upeneus quadrilineatus*
12	Squid	*Loligo* sp.
13	Stingray	*Dasyatis* sp.
14	Flounder	*Isettodes irumei*
15	Pugnose ponyfish	*Secutor insidiator*

16	Bigeye scad	*Selaroides leptolepsis*
17	Ariid Catfish	*Ariidae*

Table 4. Types of fish caught by cantrang

Fishing operations carried out by MV Mekar Citra on March 10-22, 2018, obtained approximately seven tons of fish caught with details of fish catches as in the table below.

No	Type of Fish	Volume (basket)	Price/basket (Rp)	Basket/ 30 kg	Total (Rp)
1	Spottefined bulleye	25	210.000	750	5.250.000
2	Snaper	12	300.000	360	3.600.000
3	Ray-finned fishes	7	260.000	210	1.820.000
4	Starry triggerfish	21	165.000	630	3.465.000
5	Grouper	12	150.000	360	1.800.000
6	Yellow tail fish	4	200.000	120	800.000
7	Orange spotted filefish	3	300.000	90	900.000
8	Rabbitfishes	1	150.000	30	150.000
9	Blotched grunt	1	170.000	30	170.000
10	Silver biddy	1	250.000	30	250.000
11	Goldbang goatfish	1	140.000	30	140.000
12	Squid	52	200.000	1560	10.400.000
13	Stingray	59	195.000	1770	11.505.000
14	Flounder	3	700.000	90	2.100.000
15	Pugnose ponyfish	4	125.000	120	500.000
16	Bigeye scad	2	300.000	60	600.000
17	Ariid Catfish	40	105.000	1200	4.200.000

Table 5. The composition of fish caught by MV Mekar Citra

The catches of cantrang vessels landed at the Tegalsari coastal fishing port have different numbers and dominance on each ship due to the location of the fishing operation and the fish storage system on the boat that have differences that affect the landed catch at Tegalsari coastal fishing port. The following is a graph that explains the total number or percentage of composition of fish caught landed at Tegalsari coastal fishing port according to Tegalsari BFP statistics in 2016.

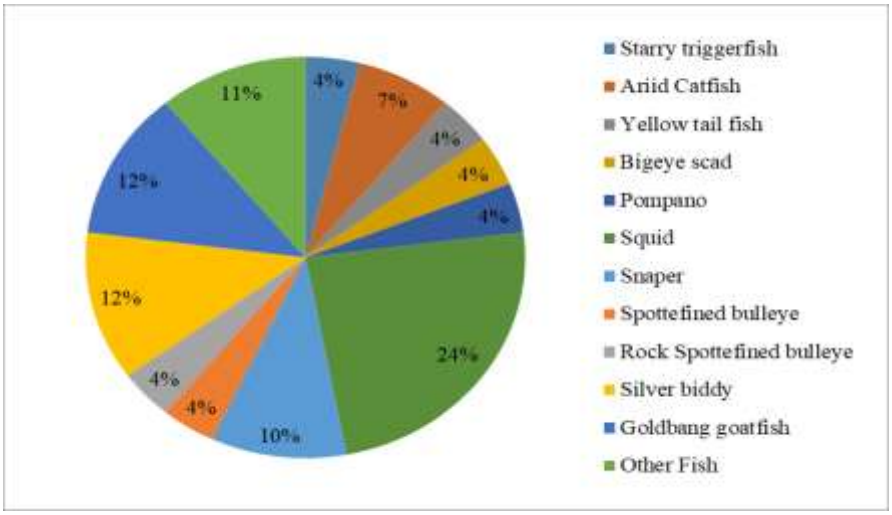

Figure 1. Percentage of composition of fish caught Tegalsari BFP statistics

Cantrang productivity

The production of caught fish landed in Tegalsari BFP by cantrag vessels has experienced a difference from year to year. It was noted that in 2012 fishery production produced by cantrang vessels was 43,713,581 kg, in 2013 there were 49,418,450 kg, in 2014 as many as 48,554,557 kg, in 2015 as many as 48,224,920 kg and experienced a significant decline in 2016, namely the total production of 31,147,660 kg.

No	Year	Production (kg)	Trips	Catches / Trips
1	2012	43.713.581	3.562	12.272
2	2013	49.418.450	3.467	14.254
3	2014	48.554.557	3.460	14.033
4	2015	48.224.920	2.883	16.727
5	2016	31.147.660	2.660	11.710

Table 6. Production, Trips and Catches / Trips

The highest catch per unit effort (CPUE) occurred in 2015 amounting to 16,727 kg / trip, this happened because in 2015 the catch obtained was 48,224,920 kg with a relatively small fishing effort which was 2,883 trips, while the catch per The lowest capture unit (CPUE) occurred in 2016 amounting to 11,710 kg / trip, this happened because in 2016 the catch was 31,147,660 kg with a relatively large fishing effort of 2,660 trip units.

According to the decree of the Minister of Maritime Affairs No. 61 of 2014 concerning the productivity of fishing vessels, it was stated that for the pull trawl fishing group it was determined that the value of productivity was two point zero (2.0). so that it can be seen that the ship productivity of cantrang fish catchers is 2.0 because cantrang is a catcher which is classified as a type of trawler. If calculated the value of productivity according to the decree of the Minister of Maritime Affairs No. 61 of 2014.

In 2017 the Tegalsari BFP served 750 units of cantrang ships, with different sizes. However, according to the existing statistical data of a total of 750 vessels, the total GT number was 19,971 GT and after the measurement verification was carried out, the total GT changed to 27,775 GT. If the productivity value is calculated according to the Minister of Maritime Affairs No. 61 of 2014. count, productivity values are generated as in the following table.

Size of Vessel	Before Verification (GT)	Before Verification (GT)
GT 5-10	210	210
GT 10-20	451	451
GT 20-30	7.830	7.860
GT 30-50	7.450	8.081
GT 50-100	3.057	7.293
GT 100-200	973	3.880
total GT	**19.971**	**27.775**
Productivity (2,0)	**39.942 ton**	**55.550 ton**

Table 7. Productivity of Tegalsari BFP cantrang vessels.

From the table above, it can be seen that the productivity value of the Tegal cantrang vessel has two versions, namely before verification and after verification, where the cantrang productivity value before verification is 39,942 tons and after verification it is 55,550 tons. If the value of productivity is compared to the amount of fish production caught by cantrang vessels landed in BFP Tegasari in 2016, which is 31,147,660 kg or 31,147 tons, the capture fisheries produced from cantrang vessels are still below the productivity limit. So that the utilization of fish resources through the use of cantrang especially in BFP Tegalsari is still at a reasonable level and has not exceeded the value of productivity.

IV. CONCLUSION

From the results of the study several conclusions were made as follows:

1. Cantrang fishing vessels operating in Tegalsari BFP are 750 units which are divided into two types, namely cantrang vessels equipped with refrigeration machines (Frezeer) and those that do not have refrigeration machines (using ice blocks) ..
2. Cantrang which is operated by Tegalsari fishermen has a relatively similar form. The difference lies in the size of the material used, where the cantrang used on large ships (> 30 GT) uses larger and longer slambar ropes (slambar length> 400 m, diameters 3 cm and net length> 30 meters) while cantrangs used by ships size <30 GT uses smaller material and size (average slambar length <220 meters, 2.5 cm diameter and net length average <33 meters)
3. Production of cantrang vessel fishing in Tegalsari BFP is a type of squid 25%, Kuniran 12%, Kurisi 10%, and followed by other types of fish (goats, echounks, selars etc.).
4. In the 2012-2016 period, the highest CPUE was in 2015, which was 16.7 tons / trip and the lowest was in 2016 at 11.7 tons / trip.

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