

# Social study of *cantrang* (Danish trawl) fisheries post Moratorium at Makassar Straits and Bone Gulf, South Sulawesi Province, Indonesia

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**Abstract.** *Cantrang* is an active fishing gear through casing fish schooling. The operation method of *cantrang* is to pull the gear from the bottom of the water. *Cantrang* is an unfriendly fishing gear due to its being modified from the trawl. In the year 1980, trawl was banned from being operated due to its damage on the environment. In 2015, through the Ministry of Marine and Fisheries, Decree No.2/PERMEN/KP/2015, the government issued a Moratorium on using the *cantrang* boat at the Indonesian management fisheries. The aim of the study is to analyze a post moratorium social impact on the *cantrang* gear. The data were analyzed using five parameters, i.e: the development of the *cantrang* gear, fishermen economic activities, availability and opportunity of the labor, structural jobless, and financial capability of the fishermen. A study was conducted in August 2016 to April 2017 at three locations, which were Takala, Pangkep and Palopo Regency. The location of the study was purposively selected with the consideration of the *cantrang* representation existing at Makassar and Bone Strait. The samples were taken using the census method with a different number of samples which was 73 units of the *cantrang* boat and the owners with the detail was 44 units at Takalar (L1), 24 units at Pangkep (L2) and 5 units at the Palopo (L3) Regency. The results showed that: 1) there was a significant change in the number of operating *cantrang*. At L1 the number of the operating *cantrang* decreased the accounts for 50%, at L2 and L3 there was a decreasing account for 100%; 2) the Moratorium is significantly affected by the decrease in the fishermen activities with a percentage decrease of 96%, 100% and 100%, in L1, L2, and L3 respectively. The decrease of the fishing activities was correlated with the financial capability of the fishermen; 3) The Moratorium caused a structural joblessness at locations of account study for 28.7%, 39.6% and 60% for L1, L2 and L3, respectively.

**Key Words:** social impact, *cantrang* Moratorium, economic activities, jobless and financial capability.

**Introduction.** The Indonesian's fishery sectors were specific and have special characteristics that could not be the same with other sectors (Sulistiyanto 2015). To get a maximum fishing yield, the fishermen have to go fishing at different locations, furthermore, a high risk of business caused the fishermen community to leave at a hard environment condition where the business was full of uncertainty (Fatmasari 2016). The characteristic of the fishermen's community was created and correlated with dynamic resources, consequently, the ownership of fishing gear was an influent factor for getting the maximum catch. One of the fishing gears that is economically profitable was *cantrang* (Danish seine). Fisheries have the characteristics of a complex adaptive system (CAS), and viewing fisheries as CAS can thus help elucidate some of the reasons behind outcomes such as the persistence of high fishing efforts despite low profits and catch (Libre et al 2015). Mallawa (2012) and Bintoro & Sukandar (2011) found that *cantrang* could produce a maximum catch, however *cantrang* was categorized as unenvironment-friendly fishing gear due to catch unselected fish size and could distract a substrate waters. *Cantrang* as well be categorized as a mini trawl. Brennan et al (2016) reviewed previous studies of trawls activity in the coastal area and conclude that extensive trawling in coastal areas have a drastic effect on the benthic environment as it smoothes over and eradicates features of the seabed, including structures like ripples, mesophotic reefs and other soft substrate habitats, aswell as reducing the complexity of the seabed. In a study of trawling impacts on sea scallop habitats on the intercontinental shelf of the

Mid-Atlantic Bight, Walker (2013) found areas where the dominant seabed roughness was composed of dredge furrows. Najamuddin et al (2017) stated that environmentally friendly fishing gear is a fishing gear that give a no-negative impact to the environment, no substrate distruction, and have a less pollutant.

The Moratorium policy in the *cantrang* fisheries was a multiplier impact on the fishermen's community of *cantrang*. Adhawati et al (2017) found that Moratorium of *cantrang* through Ministry of Marine and Fisheries decree about abanded of set net and hela net and *cantrang* is part of set net was significantly impacted on readiness of fishermen to consequence of *cantrang* Moratorium. The Cantrang Moratorium stopped the fishermen's life with the fact that the fishermen could not do any fishing activities. The Law enforcement caused the fishermen to be afraid of doing fishing. The fishermen who usually do fishing using *cantrang* could not do fishing anymore. The low level of formal education and limited skill of the fishermen caused the fishermen not to adapt easily to the new condition (Habibi 2015). The Moratorium policy impacted the fishermen's catches. Andryana (2016) mentioned that the fishermen with *cantrang* had replaced their fishing gear with other friendly fishing gears, which will decrease their income and impact the socioeconomic of the fishermen.

Pro and cons of implementing the Ministry of Marine and Fisheries Decree Number: 2/PERMEN-KP/2015 about the banned trawls and seine nets at the regional management fisheries of Indonesia is still happening (Ministry of Marine and Fisheries 2015). Ermawati & Zulyati (2015) found that all fishery community that had fishing as a livelihood got several social implications on this Ministry Decree. Sukandar et al (2015) found a recommendation about the academic study for the Ministry of Marine and Fisheries Decree NO.2/PERMEN-KP/2015 about the banned trawls and seine nets at the regional management fisheries of Indonesia. The academic studies of this Moratorium have produced a recommendation about an important further study on the implication of the Ministry Decree on the social life of the fishermen. The social study post Cantrang Moratorium at Makassar and Bone Strait, South Sulawesi is crucial and important. A publication about the impact of the post Cantrang Moratorium was limited. The aim of the study is to analyze the impact of the Cantrang Moratorium on the social aspect at three locations with four moratorium steps, such as the pre-moratorium (Pre-MR), moratorium period (MR-1 and MR-2) and the post moratorium (PMR). The parameters of research were five socio-aspects such as the development of *cantrang* gear, economic activities of the fishermen, availability and opportunity of labor, structural joblessness, and the financial capability of the fishermen.

**Methods.** The study was conducted in three locations, i.e. Location 1 (L1) in the North Galesong Takalar, Location 2 (L2) on the island of Pangkajene podang Podang Sub-district Pangkep and location 3 (L3) in the Village of Ponjalae Tappong, South Wara District, City of Palopo. The choosing of the location was done deliberately, with the consideration of the existence of *cantrang* and the inclusion of Makassar Straits for Mainland (Location 1), the Makassar Straits to represent the islands (Location 2) and the Gulf of Bone (Location 3) (Figure 1). The samples in this study were the *cantrang* boat and the owner of the boat. In the sampling, the census method was used. The number of the sample was the same as the population number, the 73 *cantrang* boats in detail were: 44 units in L1, 22 units in L2 and 5 units in L3. The research was conducted from August 2016 to April 2017.

The research data consists of the primary and secondary data. The primary data are those data that were obtained directly from the field through direct interviews and observation that were conducted using questionnaire. The secondary data are data that were obtained from government related institutions. The parameters of research were five social aspects such as the development of *cantrang* gear, economic activities of the fishermen, availability and opportunity of labor, structural joblessness, and the financial capability of the fishermen. The data were analyzed in a comparative, descriptive-quantitative and percentile manner.

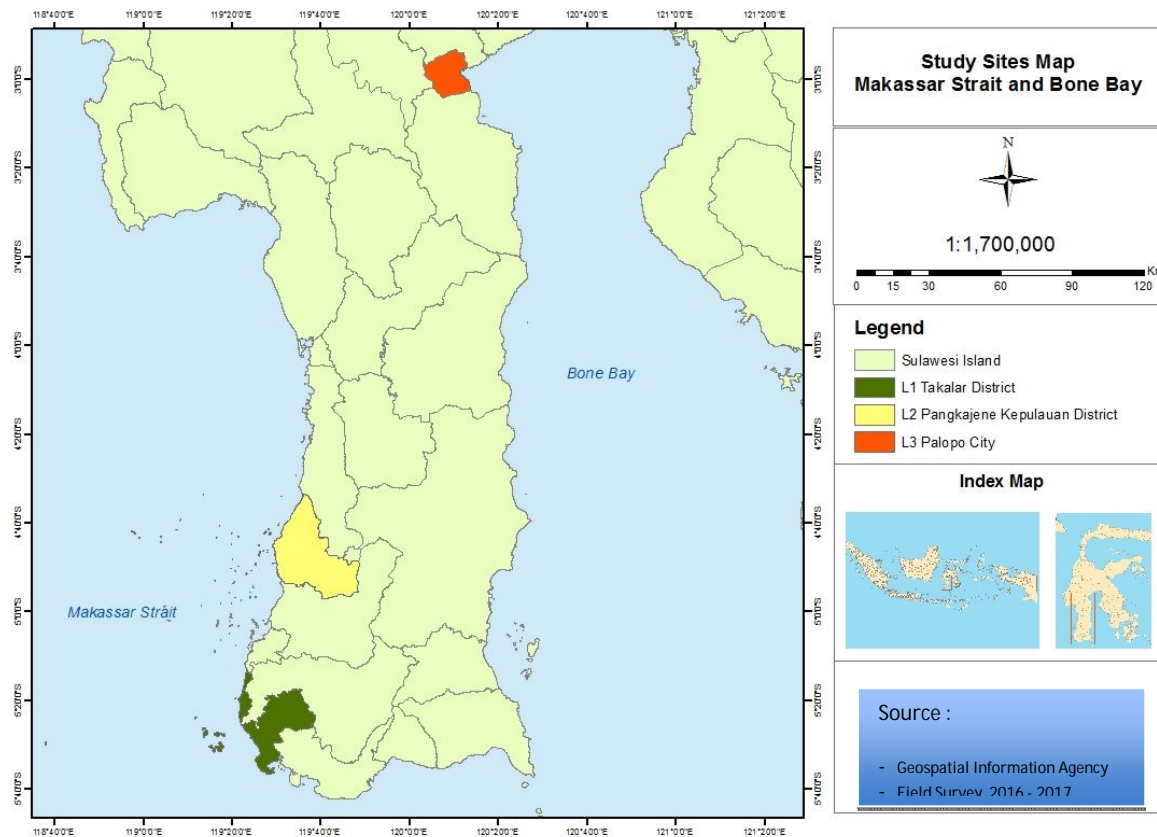


Figure 1. Study sites (Source: Geospatial Information Agency 2014).

## Results

**Development of cantrang fishing gear.** The Moratorium significantly impacted the number of *cantrang*. The number of *cantrang* used by the fishermen was decreased (Figure 2).

In L1, in the month of (1 – 3) in MR-1, the *cantrang* that was operated accounted for 44 units. The number of the decreased 3 units in the 4th-6th month and the continual reduction in the 7-9 month account for 9 units. At the end of MR-1 (in the 10th – 11th month), the operated *cantrang* reduced to 1 unit, furthermore in MR-2 the total number of the operated *cantrang* account for 29 units. This number was still steady till the 4th – 6th month. In the 7th-9th month, the number of the operated *cantrang* continually reduced and it accounts for 7 units, so the total number of the operated *cantrang* till the end of MR-2 remained 22 units.

For L2, the development of the operating *cantrang* dramatically fluctuated. In the 1st – 3rd month in MR-1, the number of the operated *cantrang* was 27 units. This number decreased for 100% account for 0 units in the 4th-6th month till the 7th-9th month. At the end of MR-1 (month of 10-11) there was a reversed pattern which was 3 units of the *cantrang* that was operated, so at the end of the MR-1 period, the total number of the operated *cantrang* account for 3 units. This number continually increased and accounted for 24 units at the end of MR-2 and in the beginning of PMR, the number of the operated *cantrang* decreased for 100% account for 0 units.

At L3, the number of the operating *cantrang* was relatively stable. The Moratorium was not significantly affected by the development of the *cantrang* in MR-1. In MR-1, the number of the operated *cantrang* was 5 units and it was still operated until the end of MR-1. The effect of the moratorium occurred at MR-2 for the 1st-3rd month till the 7th-9th month. The number of the operated *cantrang* remained 2 units or the reduced account for 3 units. In the 10th-12th month, the number of reduced *cantrang* account for 2 units, so at the end of MR-2, the total number of the operating *cantrang* was 0 units.

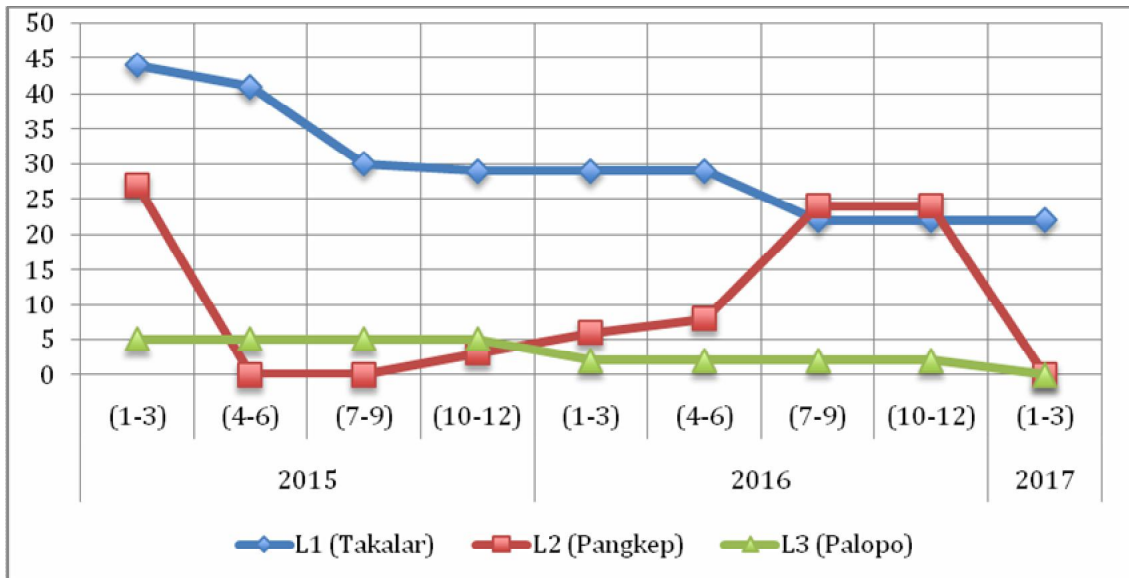


Figure 2. Development of *cantrang* fishing gear in three locations : L1 (Takalar), L2 (Pangkep), L3 (Palopo), year 2017.

**The fishermen's activities.** The fishermen's activities are fishing activities that are conducted by the fishermen who use *cantrang* fishing gear. For the three locations of research, there were differences in the fishing activities in terms of the fishing time. The *cantrang* fishermen at L1 and L3 went fishing in the night, meanwhile, the *cantrang* fishermen at L2 went fishing in the morning. The fishing activities really depend on the season. For the three locations of study, the fishing season was categorised for 6 seasons, such as; (1) transitional season west to east (TWE): January-February, (2) east season (ES): March-April, (3) peak east season (PE): May-June, (4) transitional season east to west (TEW): July-August, (5) west season (WS): September-October and (6) peak west season (PW): November-December. The number of the fishing trip based on the season is shown in Table 1.

Table 1  
The economic activity of *cantrang* fishermen per season at three locations : L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017

Season	L1 (Takalar)				L2 (Pangkep)				L3 (Palopo)			
	Pre MR	MR -1	MR -2	PC MR	Pre MR	MR -1	MR -2	PC MR	Pre MR	MR -1	MR -2	PC MR
TWE	30	22	4	6	26	32	14	0	24	22	28	0
ES	32	30	8	12	32	0	18	0	30	30	36	0
PE	40	28	14	8	38	0	42	0	38	38	48	0
TEW	34	20	8	8	30	0	32	0	32	32	32	0
WS	8	10	8	8	12	0	28	0	12	12	12	0
PW	4	6	4	8	8	16	10	0	6	6	6	0

Source: Primary Data, 2017.

**Fishermen after fishing season.** The fishermen's activities per fishing season is a number of fishing trips that are conducted by the fishermen. For the three locations of study, the number of fishing trip varied (Figure 3). In L1, on Pre-MR, the peak of the fishing activities occurred at PE and the lowest fishing trip occurred at PW. For MR-1, there was a change in the fishing activities where the number of fishing trips at all the seasons decreased, however, the peak of the fishing trip was in PE and the lowest fishing trip occurred in PW. Furthermore, in MR-2 there was a decrease in the fishing activities with the same trend. The number of the fishing trip decreased and became smaller. The peak of the activities occurred at PE and the lowest fishing activities occurred at PW and ES. At the end of MR-2, there was a change in the fishing activities but it was not significant.

In L2 at Pre MR, the peak of the fishing activities occurred at PE and the lowest fishing activity at PW. At MR-1, there was a change in the fishing activities where the number of fishing trips for all seasons decreased. The peak of the fishing activities did not change at PE but moved to TWE. The lowest fishing activities occurred at four seasons, such as ES, PE, TEW, and PW with a decrease in the fishing activities accounting for 100% (0 trips). Furthermore, there was a reverse pattern of the fishing activities at MR-2, which was the number of the fishing trips for all the fishing season and it was a similar pattern with Pre-MR. The peak of the fishing activities occurred at PE and the lowest fishing activities occurred at PW. At the end of MR-2, there was a significant change in the fishing activities. The number of fishing activities decreased to 100% (0 unit).

In L3 at Pre MR, the peak of the fishing activities occurred at PE and the lowest one at PW. The Moratorium was not significantly affected by the fishing trip of the fishermen. At MR-1, the number of fishing trip was relatively not changing, the fishermen at L3 continued fishing with the number of trips that were relatively similar with Pre-MR. The peak of the fishing activity occurred at PE and the lowest fishing activities occurred at PW. At MR-2, there was a significant change in the fishing activity. The fishermen only went fishing in three fishing seasons, such as TEW, ES, and PE. For the other three fishing seasons, the number of fishing trip was zero. This condition remained steady till PMR, where the fishing activity was zero.

*Total fishing activities.* The total fishing activity is an accumulation of all the fishing trips per fishing seasons (Figure 3). At L1, there was a change in the total fishing activity, where the total fishing activity decreased from 148 trips at Pre-MR to 126 trips at MR-1 or 15% decreased. At MR-2, the number of trips decreased and remained 35 trips or 63% decrease. Furthermore, at the end of MR-2, the fishing trips were kept in a decreasing account for 24 trips, so at PMR, the fishermen's activities only remained 6 trips and the decrease of the fishing activity accounted for 80%. The total decrease of the fishing activity from Pre-MR to the end of MR-2 was 142 trips (96%).

In L2, the trend of fishing activity was fluctuating, at the Pre-MR, the fishing activity accounted for 146 trips, in MR-1 the decreased fishing activity accounted for 32 trips or there was a decrease of the fishing activity 67%. In MR-2, there was a letter issued by the government for an extension of the Cantrang Moratorium from 31 Dec 2015 to 31 Dec 2016, the fishing activity at L2 increased and accounted for 144 trips or there was a 67% increase. At PMR, the number of the fishing trip was dramatically decreased to zero trips and the decreasing total of the fishing activity from Pre-MR in MR-2 was 144 trips (100%).

There was a different trend of the total fishing activity between L3, L1, and L2. In L3, the Moratorium was not significantly affected by the fishermen's activity. At Pre-MR, the number of the fishing trip was 142 trips, at MR-1 there was a decrease in the fishing trips which accounted 2 trips to be 140 trips. The effect of the Moratorium was significant only for MR-2 where the fishing trip decreased and account for 78 trips, so the total fishing activity at MR-2 were 64 trips or 54% decreased. At the end of MR-2, the number of fishing trips decreased to zero trips. The total decrease of the fishing activity from Pre-MR to MR-2 was 142 trips (100%).

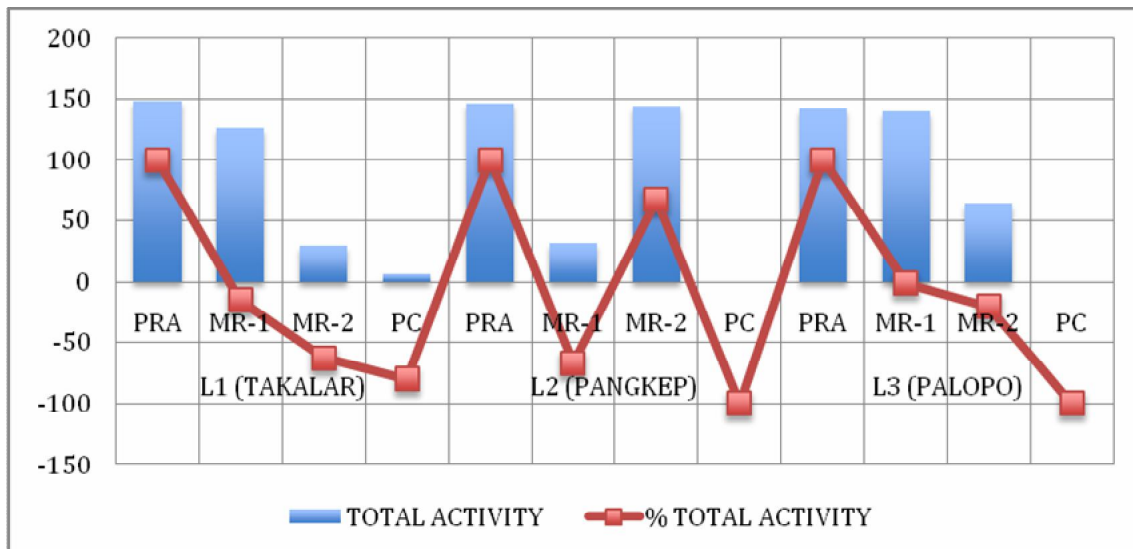


Figure 3. Total activity of *cantrang* fishermen at three locations : L1 (Takalar), L2 (Pangkep), L3 (Palopo), year 2017.

**Availability of employment opportunity.** The Moratorium was significantly on the availability of employment opportunity for the *cantrang* fisheries. The banned, *cantrang* boat caused no economic activity for the fishermen and created joblessness. To be jobless is when a person or a group of people do not have jobs, or when people only work not more than 2 days a week. The Moratorium caused the fishermen to lose their working opportunity so that the fishermen could not work even when they really need to do that job. The development of the fishermen's number at the three locations of the study showed a different trend (Figure 4).

In L1, the number of the *cantrang* fishermen decreased linearly. For Pre-MR, the number of the *cantrang* fishermen was 600, at MR-1 there was a decrease in the fishermen's number which accounts for 160, so the total number of fishermen at MR-1 was 440. At the end of MR-2, the number of the fishermen continually decreased account for 380. The remaining number of fishermen at L1 was 220 or there was a 63% decrease in the total number of fishermen.

In L2, the trend of the fishermen's number was shown as dramatically decreased. In Pre-MR, the number of fishermen was 300, in MR-1, there was a decrease in the number of fishermen till 80% account for 60 fishermen. In MR-2, there was a reverse trend, where the number of fishermen increased to 60, so the total number of fishermen at MR-2 was 240 nelayan. At the end of MR-2, the number of fishermen was zero or no fishermen that did fishing at PMR.

In L3, the number of fishermen showed a similar trend with L1. There were 60 fishermen at Pre-MR but only 50 fishermen who did economic activities at MR-1 were left. In MR-2, the number of fishermen was decreasing and it accounts for 30, so the total number of fishermen who still did fishing at MR-2 were only 20 fishermen. At the end of MR-2, the number of fishermen was zero or no fishermen who did fishing at PMR.



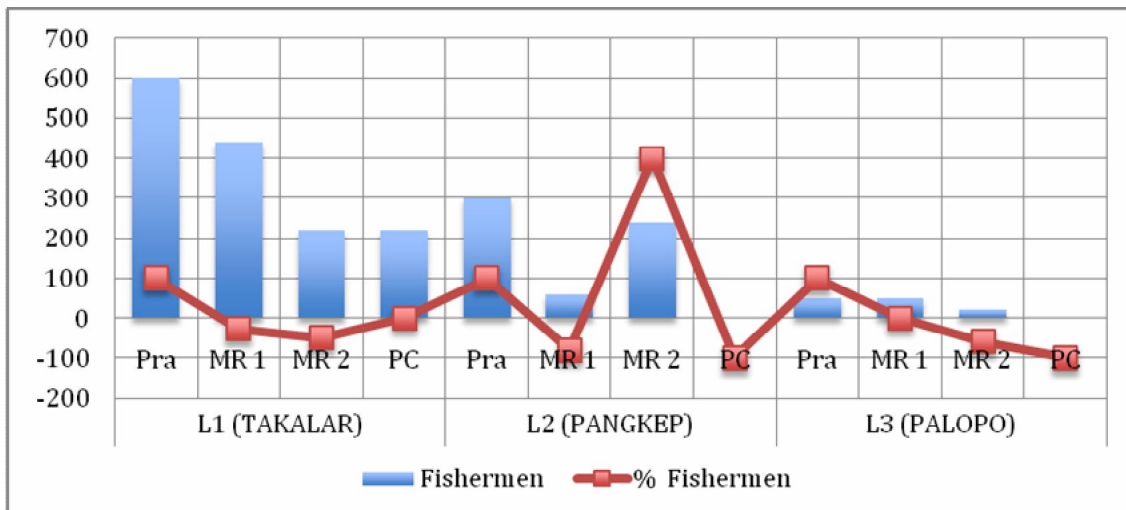


Figure 4. Development of the number of *cantrang* fishermen in the three locations : L1 (Takalar), L2 (Pangkep), L3 (Palopo), year 2017.

**Structural jobless.** Structural joblessness is a seasonal joblessness, which is due to short period of economic activities. Structural joblessness varied within study sites/locations (Figure 5).

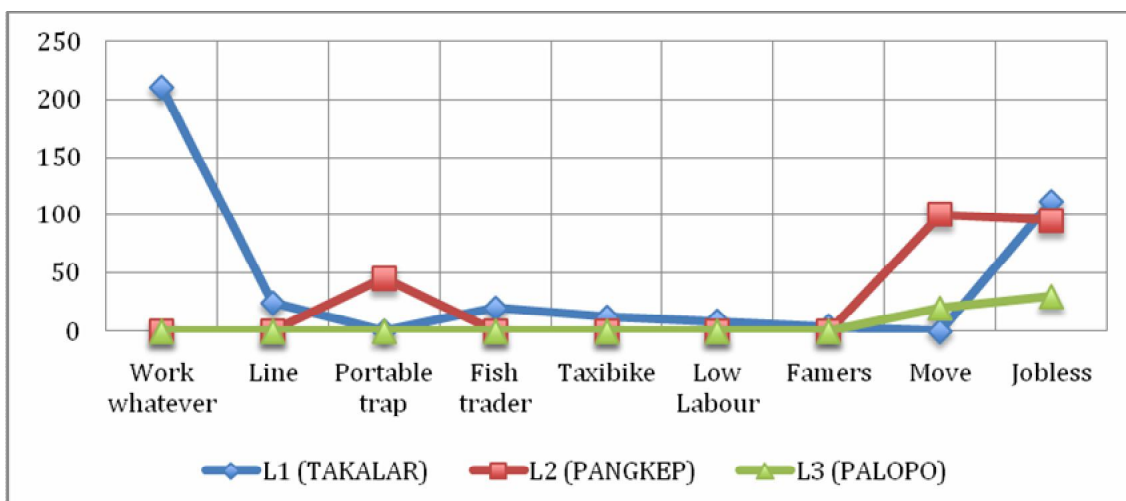


Figure 5. Social impact of post-*Cantrang* moratorium, year 2017.

At L1, the moratorium created a structural joblessness account for 390 fishermen. From 600 *cantrang* fishermen at Pre-MR who still did *cantrang* fishing activity account for 200. For survival, 300 fishermen who lost their opportunity for doing fishing found unsecure job account for 53.8% (210 fishermen), the fishermen who replaced *cantrang* with hook were 62% (24 fishermen), the fishermen who do small fish selling using bicycle/motor cycle were 51% (20 fishermen), the fishermen who rent their motorbike as a taxi bike were 31% (12 fishermen), the fishermen who do a low labor in construction were 2.1% (8 fishermen), the fishermen who worked at paddy field as a farmer were 1% (4 fishermen) and the fishermen who were jobless were 28.7% (112 fishermen).

In L2, the fishermen who lost their opportunity for fishing using *cantrang* was 300. For survival, there were 41.6% (100 fishermen) who left their place to found a new job somewhere. Furthermore, 18.7% (45 fishermen) of the fishermen changed their fishing gear to fishing traps (Bubu) and the remaining number of 39.6% (95 fishermen) kept staying at their place without jobs.

In L3, the fishermen who lost their opportunity for fishing using *cantrang* was 50. 40% (20 fishermen) moved from their place to somewhere else to find a new job. Furthermore, the fishermen who kept staying at L3 without a job was 60% (30

fishermen). In general, the Moratorium created joblessness at L1, L2 and L3 account for 28.7%, 39.6%, and 60%, respectively. The total number of structural joblessness for the three locations was 24.9% (237 fishermen).

**Financial capability of fishermen.** In the context of this study, the financial capability of the fishermen is the capability of the fishermen in fulfilling the primary needs of the household. The indicators used for measuring the financial capability of the fishermen was income. According to Triyanti & Firdaus (2016), income is an important indicator of adaptive capacity. Decreasing income will increase the resistance of life by reducing consumption, not only food but also non-food. For the three locations of study, the Moratorium caused the decrease of income and financial capability of the fishermen in fulfilling their primary needs. In L1, L2, and L3, the fishermen's income decreased to account for 70.2%, 76.7%, and 61.7%, respectively. The decrease in income correlated with the financial capability of the fishermen for MR and PMR. In fulfilling the primary needs of their household, the fishermen started using their savings and bank loan facility.

In L1, the Moratorium affected an increasing number of fishermen who use formal and informal lending. The fishermen who had loan were 38%. In L2 and L3, the moratorium affected the fishermen's saving in a gold to formal lending. 69% of the fishermen at L2 borrowed money with their gold a guarantee to formal lenders. In L3, the fishermen relied on their gold to fulfill the primary needs of their household account for 90%.

**Discussion.** The Moratorium policy for using *cantrang* as a fishing gear successfully reduced a number of *cantrang* boats which was operated and also successfully reduced the *cantrang* fishermen's number of fishing activity at the three locations of study. The number of boats and the fishermen who did fishing activities using *cantrang* decreased significantly, in two locations of study (L2 and L3), the number of boats and the fishermen who did fishing activities using *cantrang* was zero. Based on the Head of the Cantrang Fishermen Association (2016), in general, the fishermen obeyed all the rules and regulations, even though basically the fishermen had a characteristic to take a risk, however, the fishermen, in this case, will not take the risk of fishing with *cantrang*, even though they knew that their fishing gear was still allowed for their fishing activity. The obedience of the fishermen to the Moratorium policy was strong as there were several cases of the fishermen being caught by the police due to still using a *cantrang*. The two *cantrang* boats at L1 were caught by the integrated teams for implementing the policy and ministry's regulation. The fishermen had a trauma with this case as a consequence, there was a dramatic decrease in the number of operated *cantrang* boats. The consequence of the successful Moratorium in the limited number of *cantrang* caused the fishermen to lose their income. Ermawati & Zuliyati (2015) emphasized this matter, they found that not all the operated *cantrang* boats of the fishermen caused joblessness. The *cantrang* fishermen lost their jobs due to the economic activities even though they really needed their jobs.

Losing their jobs or being jobless caused a social loss, such as physiology impacts and other problems. Zarkasi (2014) mentioned that joblessness is a fearful problem. In a situation without a job, it will increase a community problem and family livelihood. Joblessness has a meaningful lost of output and severity for people who have no job (human misery). In a condition without a job, the fishermen have no income and there was a decrease of their welfare so the financial capability of the fishermen to fulfill their primary household needs were limited. This was found in line with Pradana & Soeyono (2014), they mentioned that the income was determined by the fishermen caught based on their fishing trips and activities. The number of fishes caught reflected in the level of fishermen's welfare. In the three locations of study, a research found that there was the same condition with the previous studies. The less fishing activities were significantly affected by the fishermen's income as a consequence, there was a decrease in the fishermen's welfare.



**Conclusions.** There was significantly a change in the fishermen's activities. In L1, the fishing activity post moratorium still remains 8 trips, in L2 and L3 the fishing activity at the end of the Moratorium was zero trips.

The Moratorium was significantly affected by the decreasing fishermen's activity. In L1, the fishing activities have decreased account for 96%, meanwhile, in L2 and L3 this activity has decreased to 100%.

The Moratorium impacted significantly the social livelihood of the fishermen. The Moratorium has created joblessness at L1, L2, and L3 account for 28.7%, 39.6%, and 60%, respectively. The total of the structural jobless at the three locations of the study account for 237 fishermen or 24.9% of the total number of fishermen (950).

**Acknowledgements.** This study was self-funded. We would like to thank Nita Rukminasari for helping us with the editing of the manuscript. Sri Nurul Rianawati as a village supervisor Takalar Regency, Andi Nasrun Head of village Podang-Podang Pangkep Regency, Arsyad Head of Fishermen Cantrang Association, South Sulawesi. Also, thanks to the coordinator unit O'sea Normawati, and the staff who helped us to collect data in the field.

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Received: 30 July 2017. Accepted: 22 September 2017. Published online: 07 October 2017.

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How to cite this article:

Adhawati S. S., Baso A., Malawa A., Arief A. A., 2017 Social study of *cantrang* (Danish trawl) fisheries post Moratorium at Makassar Straits and Bone Gulf, South Sulawesi Province, Indonesia. *AACL Bioflux* 10(5):1140-1149.