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# Comparative Study of Economic Value Post Cantrang Moratorium on the Waters of the Gulf of Bone and Makassar Straits, South Sulawesi Province

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## Abstract

Cantrang was unfriendly active fishing gear that operated through drag the net in the bottom of the sea floor. Cantrang also was trawl modified. Since 1980, trawl was banned to be used as a fishing gear and since 2015, government through Ministry of Marine and Fisheries affair applied moratorium for cantrang.

The purpose of this research is to examine the moratorium policy on analyze impact policy to the value of the fishermen catch, the cost of the fishermen activities and the value of the total fishermen income after cantrang moratorium on the waters of the Gulf of Bone and the Makassar Strait South Sulawesi province. The study was conducted in August 2016 until April 2017. Research carried out in 3 locations i.e. in Takalar District, Pangkep and Palopo. The location of the research was determined purposely with the consideration of the existence of cantrang and the inclusion of the waters of the gulf of bone and Makassar Straits. The sampling was using census method with the number of cantrang unit was 73, 44 units at Takalar, 24 units at Pangkep and 5 units at Palopo. Variables measured in this research were total revenue, economic activities, and total income of fishermen. Data using analysed of income and analysed of descriptive-quantitative percentage. Research results; 1). Moratorium of cantrang was significantly affected on total revenue of fishermen. Total revenue of fisherment at Pangkep, Palopo and Takalar regency were 74.4 %, 67.1 % and 27.6 %, respectively 2). Moratorium caused the reduction of the activities that correlates with the decline of total cost account for 65 %, 15 %, and 28.7 %, respectively 3).

Pangkep was a research area that most affected by moratorium policy. The moratorium caused fishermen total income at Pangkep account for 76.7 % and followed by Palopo account for 70.2 % and Takalar account for 27.6 %

**Keywords**: Economic Studies, Cantrang, Catch Value, Economic Activity, Revenue, Income

## INTRODUCTION

A moratorium on the use of the catch fish have been done in 1980. Through Presidential Decree, No. 39 year 1980 article 2, government banned the use of traw for catch fish and shrimp. A moratorium on the appliance fish trawling off the source of income. and caused a serious problem, even after the ban on the use of trawls, not significantly impacted in the improvement of the fishermen welfare (Ghufran 2015).

The condition of the 1980 post banning trawling was not significant difference from the current conditions. Regulation of the Minister of Maritime Affairs and Fisheries No. 2 year 2015 article 2, which prohibits people use fishing gear of nets helah (trawls) and seine nets in all areas of Fisheries Management of the Republic of Indonesia. Article 4 verse (2) that forbade anyone using boat or vessel seines, one of which was cantrang also had an impact on the level of welfare of the fishermen. (Ministry of Marine fishery 2015)

The moratorium caused fishermen do not have jobs and have no income. According to Sukandar et al (2015) a moratorium will lower catches and fishermen income, tens of thousands of fishermen with fishing household will lose the work from the fisheries business unit. Fish catches will be down all of a sudden until a new equilibrium occurs. Fish processing business unit will occurre raw material shortages until a new equilibrium with the redirection of business. Reduced jobs dramatically that is indicated from the amount of labor absorbed before the existence of the new jobs alternative (Huwae 2015; Sukandar et al. 2015)

According to Ermawati and Zulianti (2015) in East Java, after a moratorium, there was 30 % fishermen activities will take place each month, 40 % of fishermen switches to other businesses, and 30 % of fishermen do free lance work at fishing port. This condition caused the fishermen economy were more far from adequate to meet the needs of his life (Retnowati 2011). The fishermen live with the economic condition of the uncertainty income (Sarjulis 2011).

Previous research results and studies that have been done relate to cantrang moratorium, it can be concluded that there was lack of study about the economic value of cantrang fishermen in South Sulawesi after a moratorium and it is very few publication regarding the impact of cantrang moratorium to fishermen economic. Based on those reasons, economic studies post cantrang moratorium is a novel and

new study that deserves to be examined and analyzed more detail and dept. Aims of the study were to examine comparatively of cantrang fishermen economic value at three locations (Takalar Pangkep and Palopo) in South Sulawesi Province. Economic studies was covered 3 stages of the moratorium implementation policy namely :

1. The study of the fishermen catch value at the time of Pre Moratorium (Pre MR), a moratorium (MR-1 & MR-2)
2. The study of economic value on fishermen activities of the Pre MR, MR-1, MR-2
3. The income of fishermen on Pre MR, MR-1, MR-2.

## RESEARCH METHODOLOGY

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

Research Data consists of primary and secondary data. Primary data was data that obtained directly from the field through direct interviews and observation that conducted using questioner. Secondary data was data that obtained from government related institutions.

Observation parameters include the value of the fishermen catch, economic activity and the income of cantrang fishermen in three locations. The parameters observed were analyzed using the analysis of income and analysis of descriptive-quantitative percentage with the formula as below:

1. The analysis of income

   Yt = TR - TC TR = Q X P, TC = FC VC

   where : Yt = Total Income, TR = Total Revenues, TC = Total Cost. FC = Fixed Cost, VC= Variables Cost , Q = Quantity, P = Price,

2. Analysis of descriptive-quantitative percentage namely

   Yt % = (Yt2/Yt1 x 100 %)

   Where : Yt1 = Income Pre Moratorium, Yt2 = Income after a moratorium

## RESULTS

### A. INVESTMENT

Investment is the initial capital to purchase goods - capital goods. Investment consists of the net, cords selambar including bearers and buoy, boat and machine including the axle machine used to pull, ropes and nets cantrang sheet.

#### 1. The Value Of Investment

Three research locations, the biggest investment value was come from boat investment, followed by machine, net and ropes. Per location per types of investment, L1 was the location of the research, with the value of investment was the smallest, where 3 (three) out of 4(four) types of investment were used, namely the boat, machine and the net that had the smallest investment value. Only a rope which have investment value is greater than the two other locations. On the contrary L2 was the location of the research with the largest investment value where 3 (three) out of 4 (four) types of investment was used, namely the boat, machine and the net, had the largest investment value. Only a rope,which had investment value was lower than the investment value in L1 but greater than L3. Furthermore L3 was the location of the research had investment value was smaller and greater than the value of investment at L2 and L1. 3 (three) out of 4(four) types of investment was used, namely the boat, machine and the net, had investment value was greater than the value of the investment at L1 and smaller than the investment at L2. One type of investment which was cords had the smallest investment value than both other locations. The total value of the largest investment sequentially located in L2, L3 and L1 with a total investment of Rp 291,714,996 per unit, Rp 227,155,000 per unit and Rp 200,945,000 per unit, respectively.

#### 2. Depreciation of investment value

Depreciation is the value of investment that has been used in business activities. Depreciation calculated from total investments after divided by the age of economy investment. In L1 the largest depreciation came from the net followed machine, boats and ropes. In L2 and L3, the largest depreciation of investment value came from mechine then net, boats and ropes. Per location per types of investment, L1 was the location of the research with the value of the smallest depreciation, where 3 (three) out of 4(four) types of investment was used, namely the boat , machine and net had the value of the smallest depreciation. Only a rope, which had the value of depreciation was greater than the two other locations. On the contrary, L2 was the location of the research with the value of the largest depreciation, where 3 (three) out of 4 (four) types of investment that was used boat, machine and the net, had the value

of the largest depreciation. And only a rope, which had a depreciation value smaller than the value of investment in L1. Furthermore L3 was the location of the research that have depreciation value of investment was smaller and greater than the value of depreciation investment in L2 and L1. Three out of 4(four) types of investment was used, namely the boat, machine and the net, had depreciation value was greater than the value of the depreciation in L1 and smaller than depreciation investment in L2. One types of investment, namely cords had the value of the smallest depreciation than the two other locations. The Total depreciation largest investment sequentially located in L2, L3 and L1 account for Rp 30,234,260 depletion per unit per year, Rp 26,003,807 per unit per year and Rp 21,974,122 per unit per year, respectively.

## B. THE VALUE OF CANTRANG CATCHES

Cantrang catch value was classified in two groups namely the value of the fishermen catch based on fishing season (SR) and the value of the fishermen catch total fishing season (TR). The value of the catches was the value of the fishermen revenue per season or the value of the total revenue of the fishermen from all seasons multiple with the selling price of the catches. For three research locations, fishing season were grouped into 6 seasons namely (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.

### 1. Revenue Season (SR)

For Pre Cantrang moratorium, season revenue (SR) of fishermen for three locations was relatively similar. The highest SR was found at peak east season and the lowest SR was found at PW. For MR-1 at L2, there was changing in catch season. The highest SR was occurred at TWE, where SR at L2 was higher than SR at L1 and L3, meanwhile the lowest SR was occurred at four seasons, such as PE, TEW, and west season with value of SR was zero. On the other hand, for L1 and L3 there was no changing in season catches. Catch season which had the biggest contribution to the highest SR was occurred at PE and the lowest SR was at PW. Furthermore, for MR-2, there was also changing in catch season with the similar pattern at Pre-MR. For three locations, the highest SR was occurred at PE and the lowest SR was found at PW. SR fishermen's was getting lower and there was a significant difference of SR for L3 compared to fishermen from L1 and L2. At PE, SR at L3 was a higher than SR at L1 and L2, and value of SR was further at SR in Pre MR. On the other hand, at TEW, WS, and PW, SR at L1 and L2 was a higher at L3 where SR at L3 was significantly decreasing till zero rupiah.

### 2. Total Revenue (TR)

TR was accumulation of revenue for all catches season. Cantrang moratorium affected significantly to total revenue of fishermen. For Pre-MR, TR for all locations was similar. For MR-1, TR for three location was sigficanlty changing, at L2, TR decreased 68.9%. This decreasing was bigger than decreasing of TR at L1 and L3 that only decreased account for 33.8% and 32.4%, respectively. Furthermore, for MR-2 at three locations of research, TR decreased, however decreasing of TR was only occurred at L1 and L3, account for 58.3% and 51.3%, respectively. TR at L2 was relatively stable, and only decreased account for 15%. Total decreasing of TR from Pre-MR to MR-2 for L1, L2, L3 were 72.4%, 69.8% dan 67.1%, respectively.

## B. CATCH OPERATIONAL COST

Cost is an effort for production process that measured with money unit based on current and future market price. Cost consists of fix cost and variables cost. Fix cost is a cost that spend with the same value during activities. Fix cost consists of depreciation investment cost, maintainance boat cost, net, machine and boat painting cost and licence cost. Variables cost is a cost that spend with varied value based on one period of activities. Variables cost consists of fuels, oil, consumption, ciggarates, ice, and retribution. For three locations of research, cost was classified into two grouped, such as catch operational cost per catch season and total operational cost.

### 1. Cost Season (CS)

Pre Moratorium, CS for three locations was similar. The biggest CS was found at PE and the lowest CS was occurred at PW. For MR-1, there was changing in season at L2, the highest CS was found at TWE where CS at L2 was a higher than L1 and L3. The lowest CS was found at four seasons, which were ES, PE, TEW and WS with CS was zero. On the other hand, for L1 and L3, there was not changing in season, the highest CS was found in PW and the lowest CS was occurred at PW. Furthermore, for MR-2, there was a significantly changing in CS in L1 with CS in L2 and L3. In L1, CS in PE was smaller and far below CS at L1 in the same season. In L2, there was changing in CS between MR-1 and MR-2 for TWE. This changing was also occurred for TEW, WS, and PW. CS in MR-1 was zero, there was a significantly increasing in CS for MR2 which the value of CS was similar with Pre-MR. For L3, CS at PE was a higher than CS for Pre-MR and MR-1. On the contrary, for TEW, WS and PW, CS was dramatically decreasing account for zero.

### 2. Total Cost (TC)

TC at Pre MR for three locations was not different. In MR-1, there was a significantly changing in TC at two locations, such as L1 and L2 where TC for both locations decreased account for 33.3% and 38.3%, respectively. For L3 there was not changing in TC. Furthermore, TC for three locations was changing with the pattern was different from MR-1. TC at L3 for MR-2 decreased account for 28.7%, meanwhile TC at L1 showed a further decreased account for 52.4%. On the other hand, TC at L2, there was increasing significantly in MR-2 account for 222%. In general, the decreasing of TC from Pre MR to MR-2 for three locations were 65%, 15% and 28,7%, respectively.

## C. FISHERMEN INCOME

Income was a value that calculated by multiple between total cathes and price and reduce all cost for one period of operational. Income was clasiffied into two groups, such as season income and total income. Season income (Ys) is an income that come from revenue (Rs) after reduced by CS. Total income (Yt) is an accumulation income from all revenue seasons after reduced by TC.

### 1. Income Season (Ys)

In Pre MR, Ys for three locations was similar. The highest Ys was found at PE and the lowest Ys was occurred at PW. In MR-1, Ys for three locations decreased significantly. At L1 and L3, the highest Ys was found at PE and the lowest Ys was occurred at PW. At L2, there was a changing in Ys, the highest Ys was found at TWE and the lowest Ys was occurred at ES, PE, TEW, and WS account for zero rupiahs. Furthermore, in MR-2, there was a significantly changing in Ys for L1 and L2 with L3. In L1, the highest Ys was found at PE, however, there was a dramatically decreased of Ys compare to MR-1. The lowest Ys was found at TWE. In L2, there was significanlty changing in Ys, the highest Ys was found at PE. The lowest Ys was occurred at PW. In L3, there was a reversed pattent of Ys. Ys increased significantly at PE, however, for other three seasons (TEW, WS, and PW) Ys was zero.

### 2. Total Income (Yt)

Total income is accumulation of Ys. Moratorium affected significantly to toal income of fishermen. For Pre-MR, Yt for three locations was similar. In MR-1, there was a significantly changing in Yt, in L2, Yt decreased account for 73.6%. This decresing was a higher than decreasing of Y for L1 and L3 which only decreased account for

36.7% and 44.7%, respectively. Furthermore, in MR-2, Yt for three locations was decreasing, however, the significanlty decreased was occurred at two locations, such as L1 and L3, account for 52.9% and 31%, respectively. Yt at L2 was relatively stable and only decreased for 12%. In general, total decreasing of Yt from Pre-MR to MR-2 for L1, L2 and L3, account for 72.2%, 76.7% and 61.71%, respectively.

**Table 1.** Investment Value Cantrang in L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017

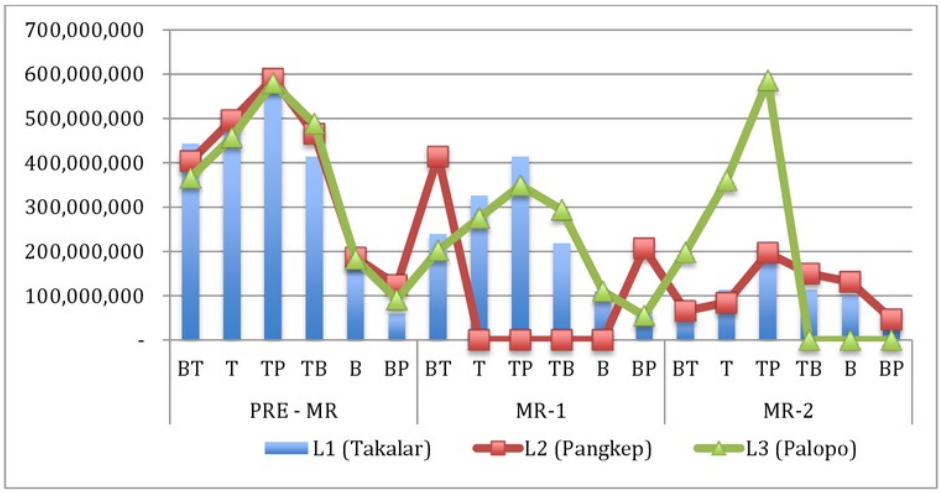
| No | Location | Investment Value (Rp) | | | | Total |
|---|---|---|---|---|---|---|
| | | Net | Salambar string | Boat | Machine | |
| 1 | L1 | 42,845,000 | 24,531,818 | 89,931,818 | 43,636,364 | 200,945,000 |
| 2 | L2 | 48,550,833 | 22,580,829 | 133,375,000 | 87,208,333 | 291,714,996 |
| 3 | L3 | 47,995,000 | 21,993,333 | 101,000,000 | 56,166,667 | 227,155,000 |

*Source : Primary Data, 2017*

**Table 2.** The value of Depreciation investment Per Type and Per Year In L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017.

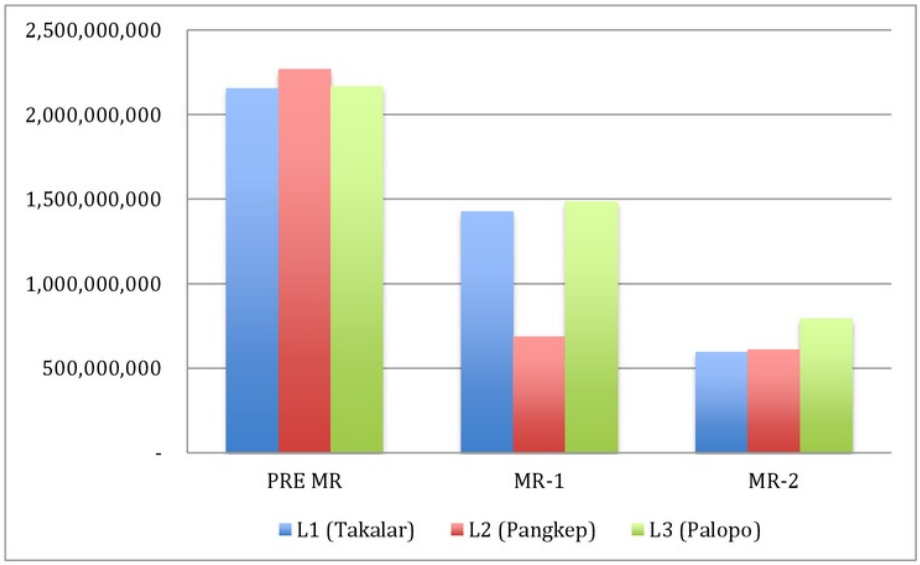
| No | Location | Value Of Depreciation (Rp/th) | | | | Total |
|---|---|---|---|---|---|---|
| | | Net | Salambar string | Boat | Machine | |
| 1 | L1 | 7,140,833 | 4,088,636 | 5,290,107 | 5,454,545 | 21,974,122 |
| 2 | L2 | 8,091,806 | 3,763,472 | 7,477,941 | 10,901,042 | 30,234,260 |
| 3 | L3 | 8,115,833 | 3,647,778 | 5,990,196 | 8,250,000 | 26,003,807 |

*Source : Primary Data, 2017*



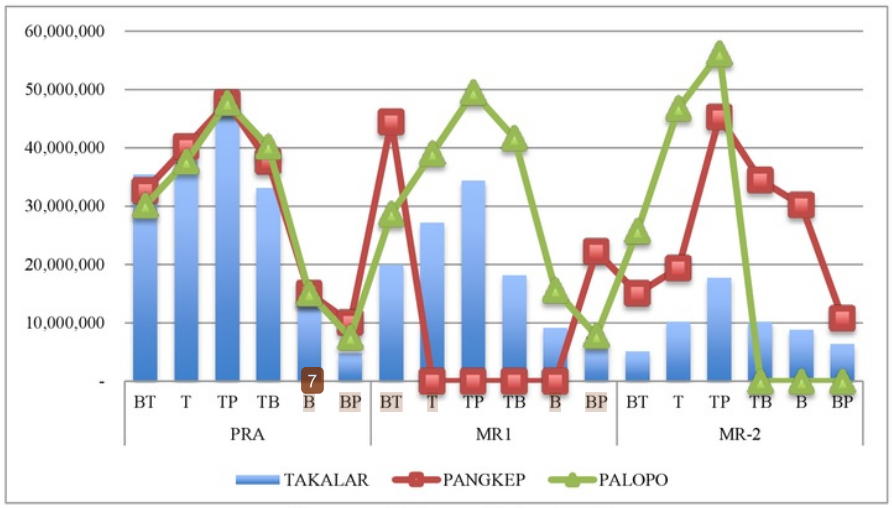

*Source : Primary Data, 2017*

**Figure 1.** The Value of Fishermen Catches per Catch Season in L1 (Takalar), in L2 (Pangkep) and L3 (Palopo ), 2017



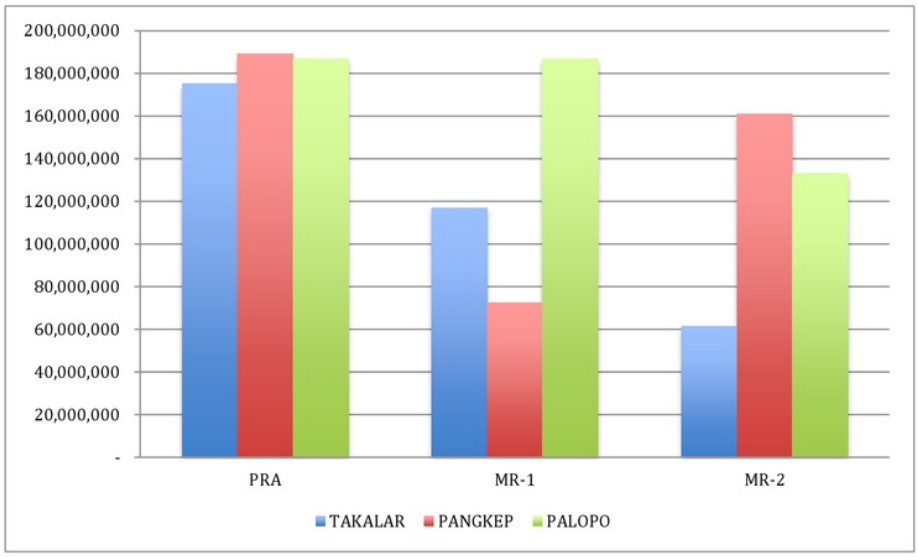

*Source : Primary Data, 2017*

**Figure 2.** The value of Total Revenue of Cantrang Fishermen Per Type and Per Year In L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017



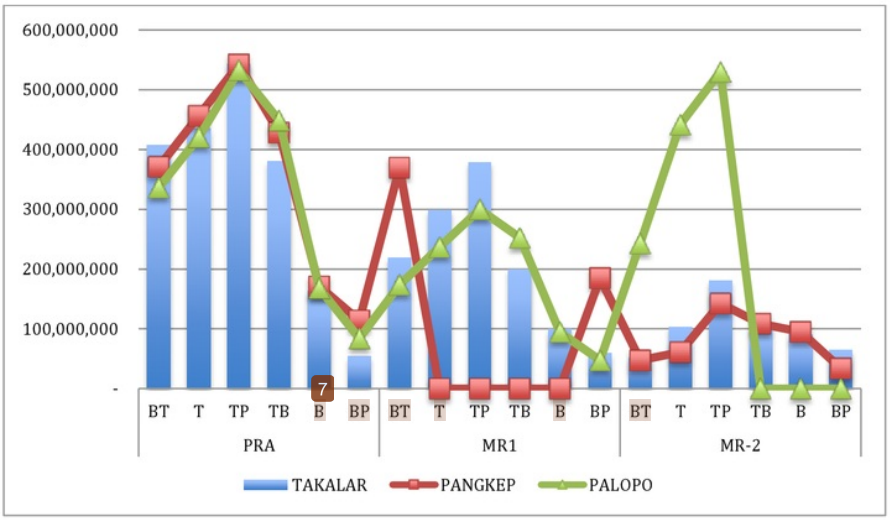

*Source : Primary Data, 2017*

**Figure 3.** The cost per type for Per Catch season in L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017.



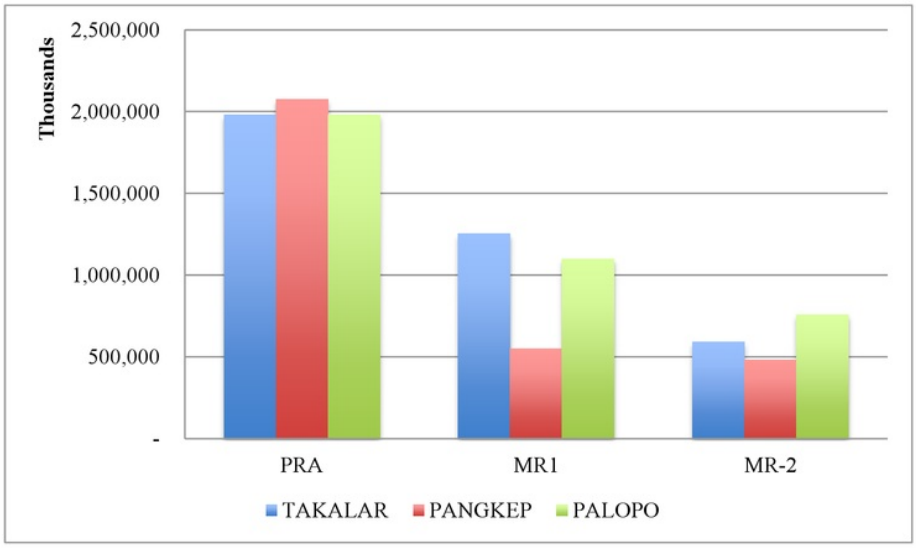

*Source : Primary Data in though, 2017*

**Figure 4.** Total Cost (TC) Per Type and Per Year In L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017.




*Source : Primary Data, 2017*

**Figure 5.** The income per type and per season in L1 (Takalar), L2(Pangkep) and L3 (Palopo), 2017.




*Source : Primary Data, 2017*

**Figure 6.** Total income per year in L1 (Takalar), L2 (Pangkep) and L3 (Palopo), 2017

**DISCUSSION**

Boat is the biggest investment for cantrang fishery. Based on Indonesian Act Nomor 31 year 2004, fisheries boat is a ship, boat or other floating equipment for catch fish and support fisheries activities. Cantrang boat was used as main equipment device for fishing activities combine with cantrang net. Without boat, cantrang net could not be operated. Leo (2010) mentioned that boat for cantrang fisheries, generally have capacity aroung 10 – 30 GT with length of boat an average 12 – 15 meter and width of boat aroun 6 – 8 meter. At Brondong fishing port, cantrang was called as Payang. In three locations of research, the average of boat length was 15.4 – 19.6 meter with width of boat was 3.4 – 4.2 meter and height of boat was 1.2 – 1.5 meter. Weight of boat was 22 – 24 GT. Wahju R (2012) Based on weight of boat, cantrang boat was grouped into three type, such as a big boat (≥ 30 GT), medium boat (10 – 30GT) and small boat (<10 GT) Kapal, so boat at three locations was categorized as medium boat. Based on Ministry of Marine and Fisheries decree nomor 2 year 2011, it mentioned that using of cantrang as fisheries gear was allowed with condition, that cantrang was used at boat < 30 GT and the area of cantrang operation have to be no more than 12 nautical miles and still under fishing area. Nevertheless, cantrang at three location of research was not included as prohibited fishing gear. As a consequence, till year 2015, fishermen at three locations of research were still buying cantrang as inverstment. 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 short period of moratorium (January – December 2015) and exptended period of moratorium (January – December 2016) caused a double effect to fishermen income. First moratorium effect (MR-1) showed by decreasing fishermen activities at L1, account for 33.3% that caused decreasing of total catch account for 33.8% as a consequence, decreasing of fishermen income account for 36.7%. In L2, there was decreasing fishermen activities account for 38.3% that caused decreasing of total catch account for 68.9% as a consequence, decreasing of fishermen income account for 73.6%. In L3 there was decreasing fishermen activities account for 30% that caused decreasing of total catch account for 32.4% as a consequence, decreasing of fishermen income account for 11.7%. Cantrang moratorium could change a fishing season. Wardani et al (2012), the highest month of fishing productivity was in april and the lowest month of fishing productivity was in November. Leo (2010) divided fishing month activities into three season, such as east season (ES), west season (WS) and transition season (TS). ES is in June – August, WS is in Dec – Feb and TS is a transition period between ES and WS and vice versa. Our finding relate to fishing season was lined with Wardani et al (2012) and Leo (2010) for pre-MR. However, for MR-1 there was a contradiction results, which the highest total catch was found at TWE not in PE and the lowest total catch was occurred at ES, TEW and WS with the total catch was zero. It was assumed due to fishermen was stop to go fishing in third

month of March in MR-1 and fishermen do fishing again in elevent month of Nov in MR-1. In this time, notification letter from Ministry was issued about extended of cantrang moratorium.

Second moratorium effect (MR-2) showed by decreasing fishermen activities at L1, account for 52.4% that caused decreasing of total catch account for 58% as a consequence, decreasing of fishermen income account for 52.9%. In L3 there was decreasing fishermen activities account for 28.7% that caused decreasing of total catch account for 51.3% as a consequence, decreasing of fishermen income account for 31%. In L2, there was increasing fishermen activities account for 222% that caused decreasing of total catch account for 15% as a consequence, decreasing of fishermen income account for 12%.

For MR-2, fishermen at L1 and L2 did fishing activities with the average of fishing frequency was smaller than fishing frequency in Pre-MR. It was not only caused by traumatic of fishermen due to MR-1 but also due to lack of investment for operational cost of fishing. Moratorium was dramatically changing in fishermen welfare. Pre-MR, fishermen had a high income, in MR-2 fishermen have to start again from zero. Moratorium was applied in short period and there was uncertainty of MR period caused the worst condition of fishermen and also fishermen have to face uncertainty of MR consequence. Ermawati and Julianti (2015) stated goverment have to give a time for fishermen around 2 – 3 years for cantrang been prohibited, so fishermen have a time to replace a cantrang to allowable fishing gear. Goverment have to give a solution for fishermen about cantrang moratorium, so goverment regulation could not give a bardon to fishermen. Conversion fishing gear from cantrang to other enviromental friendly fishing gear required long time and big investment, on the other hand, fishermen have bought a cantrang through bank loan. Ideally, goverment given a time for fishermen to adjust with a new regulation. Our result also found that fishermen from three location of research was required a time and fund to adjust with moratorium regulation. So our finding was lined with previous study by Ermawati and Julianti (2015). Based on our result,we assumed that before moratorium been applied, goverment have to conduct investment study, so length period of moratorium could be adjusted by investment that belong to the fishermen, situation, condition and characteristic of region. As a result, each region could reduce the negative impact of moratorium or goverment policy. Each region have a different characteristic in terms of resources, culture, and level of walfare of fisherment, consequently the impact of moratorium will be different for each region. For example, our results found that fishermen at L1 got a bigger impact of moratorium than other two locations. It caused that L1 was a mainland at Makassar Strait and only 45 km in distance from capital city of South Sulawesi Province, fishermen at L1 was quicker and easier to access information as a result, step of moratorium was easy to accept and understand. On the other hand, fishermen at L2 had a bigger negative impact of moratorium than other

two locations. L2 was an island area at Makassar Strait, access from island to regency required at least 2 hours by boat and it was 51 km the distance between capital city of regency to capital city of province. We assummed that the distance was one of a factor caused a higher negative impact of moratorium for fishermen. L3 was mainland in Bone Strait, the distance between location and capital city of province was 376 km, but there was no bearear for getting of information due to easy access to capital city of province. Local goverment at L3 have issued a local regulation relate to cantrang before moratorium of cantrang from state goverment, so fishermen have been stopped using cantrang before second moratorium was finished.

## CONCLUSIONS

1. Moratorium was significantly affected to total revenue of fishermen. Pangkep regency was a research area that most get an negative imfact from moratorium policy. The moratorium caused reducing in total revenue 74.4 % and followed by a Palopo estimated 67.1 % and Takalar of 27.6 %.
2. Moratorium showed a significantly effect to fishing operational cost. The amount of cost correlated with the activities of fishing. Takalar regency was the most impacted by moratorium policy. The moratorium caused the reduction of fishing activities of fishermen in Takalar account for 65 %, Pangkep of 15 %, and Palopo of 28.7 %.
3. Moratorium was a significant influence on the total income of the fishermen. Pangkep was a research area that most impacted by moratorium policy. The moratorium caused reducing of total income in Pangkep account for 76.7 % and followed by a Palopo 70.2 % and Takalar of 27.6 %

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