The Contribution of Fisheries Sector in Regional Development of Batam City of Riau Islands Province, Indonesia

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ABSTRACT

This research aims to analyze the growth of the fisheries sector, analyze the commodity market strength of the fisheries sector and analyze the strength of the fisheries sector's base and non-base sectors in regional development in Batam City. The method used in this study is a quantitative method using secondary data cross-section and time series which are then analyzed using descriptive statistics, and qualitative methods using primary data obtained through interview questionnaires. Analysis of the data used is growth index analysis, Trade Area Capture (TAC) analysis, Pull Factor analysis (PF) and Minimum Requirement Approach (MRA) analysis. The results of the growth index analysis show that the GDP of the fisheries sector in the Batam City has increased by 126 % in the period 2013-2018. The results of the 2013-2018 TAC analysis showed that the TAC value> population indicated that Batam City was able to capture the opportunities of trade in fisheries products in other regions. PF value of the Batam City fisheries sector> 1 which shows that the Batam City region can attract customers from other regions and has a specialization in terms of fishery product markets. MRA analysis results in Batam City in

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2017 obtained the largest base multiplier in BatuAji District with a value of 2.4 which means that every 20 workers in the base sector are expected to create 4 workers in the non-base sector.

1. INTRODUCTION

Regional dimension development, in general, is often referred to as regional economic development in the context of the macroeconomy, for example, regional development in both provinces and cities [1-5]. The purpose and objectives of regional development are to advance economic growth and regional competitiveness, as well as reduce disparities between regions and develop community life [4-9]. Gross Regional Domestic Product (GRDP) is one indicator of the level of development progress and community welfare in an area.

Batam City, which is in the Riau Islands Province, is one of the cities with the highest growth potential in Indonesia. Its strategic location, close to Singapore, makes Batam City one of the main destinations for business and commerce. The city of Batam geographically has a very strategic location, which is located in the international shipping lane. Batam City based on Regional Regulation number 2 of 2004 concerning Spatial Planning for Batam City 2004-2014, is located between 0° 25'29' ° -1° 15 '00 Utara North Latitude 103° 34 35 35 - 104° 26' 04 Timur East Longitude. Batam City is bordered by other regions and countries. This has implications for the geostrategic position of Batam City, Singapore and Malaysia, which are located north of Batam City, as a macroeconomic, it has a significant influence on the economy of Batam. The strategic location of Batam has become the attraction of Singapore to relocate their industrial activities to Batam because of the availability of sufficient land and the ease of investment provided. The southern part of Batam city is bordered by the area of Lingga Regency and in the west with Karimun Regency and the international sea. The geographical characteristics of this region are not very different, so are the socio-cultural aspects. Karimun Regency is an area of the Riau Islands Regency (now Bintan Regency) which was established simultaneously with Batam City. This area is famous for its granite mining industry and fisheries production which is also a necessity for the development process of Batam City.

The potential of fisheries in Batam City, Riau Islands Province must continue to be optimized as well as possible. Development resources are used to achieve comparative advantages and competitive advantages for the development of an existing company and a new company, and to maintain its economic base owned by the region concerned [9-13]. Not only in the capture fisheries sector, but also in the aquaculture sector. Popular aquaculture in Batam City, Riau Islands, is in the form of ponds and ponds. Based on the potential of the sea area, it can be said that the pond fisheries have not been utilized optimally because the area utilized for ponds is lower than ponds. Less optimal utilization of the fisheries sector must be addressed so that the fisheries sector is able to provide a dominant effect on the development of the Batam City of the Riau Islands Province.

Batam City has a long coastline, relatively large sea area and abundant marine wealth. Even though it has high marine potential, the people of Batam City have not forgotten the potential of aquaculture. Batam City community explores the potential of brackish water and fresh water by building ponds and conducting freshwater fish farming. The amount of capture fisheries production in Batam City is greater than the amount of aquaculture production, both in ponds, ponds, rice fields, floating net cages and public waters. The amount of capture fisheries production in 2018 in Batam City was 34,010.00 tons and aquaculture was 5,893.99 tons. The commodity with the largest amount of production value is grouper for capture fisheries and grouper fish, catfish, tilapia, carp for aquaculture [9-10]. So that optimization of the aquaculture sub-sector is needed so that the contribution of the fisheries sector has a dominant effect on the GDP of Batam City.

The level of public education in an area will influence the development of the area. Education is considered as an effective way to enhance development in which developing countries devote considerable attention to the development of education. The cause of the low level of education of the fishing communities in Batam City is the poverty of the fishing communities.

The fishing community is described as characterized by a low level of life (low income and low standard of living) of the community. The characteristics of poverty are very evident in fishing communities, namely the pattern of living and the availability of their poor boards and the standard of living of fishing communities are at a decent standard of living [13-15]. Education is one of the efforts in improving the welfare of the community. The higher the education, the higher the chance to get a greater income to meet the needs of all family members. Therefore development in the fisheries and marine sector must have a goal to improve the welfare of fishermen. If the fisheries sector is able to provide good income for fishermen, it will not only improve their welfare, but also prevent urbanization from coastal areas [15-17].

Regional development must be following the conditions of the potential and aspirations of people who grow and develop. If the implementation of regional development priorities is not following the potential of each region, the utilization of existing resources will be less than optimal so that it can result in a slow process of economic growth in the area concerned [9-10, 16-20]. Batam City has advantages and problems in the fisheries sector in regional development efforts. Therefore it is necessary to research "The Contribution of the Fisheries Sector in Regional Development of Batam City Riau Island Province".

This research aims to determine the contribution of the fisheries sector in the regional development of the Batam City by analyzing the growth of the fisheries sector, the strength of the fisheries commodity market and the strength of the base and non- base sectors in Batam City. The results of this research are expected to be useful as a reference in decisions or policies, particularly the local authorities as a consideration in drawing up the planning strategy for the development of fisheries sector as well as a reference to the another to add to the knowledge and insight into the information.

2. METHODS

This research was conducted in Batam City, Riau Islands Province in December 2019 - February 2020. The types of data used are quantitative and qualitative data. Data sources used are primary data and secondary data. Primary data were obtained through interviews with fisheries communities and fisheries stakeholders in Batam

District. Secondary data was obtained through the Central Statistics Agency of Batam City, the Department of Maritime Affairs, Fisheries and Food Security of Batam City, the Central Statistics Agency of Batam City and other relevant institutions. This research uses quantitative methods and qualitative methods. The quantitative method uses data consisting of numbers and analyzed using statistics. The data that has been obtained is then analyzed to be able to answer the problem formulation and the proposed hypothesis. The statistics used to consist of descriptive statistics that analyze data by analyzing or describing datat hat has been collected. The qualitative method uses an interview questionnaire that will describe the condition of fisheries in the Batam City and the aspirations of the fishing community in the development of fisheries in the Batam City. Qualitative methods are used to explain a phenomenon profusely by collecting data [15-16].

2.1 Data analysis

Analysis of the data used in this research is quantitative and qualitative. The quantitative analysis used is:

2.1.1 Analysis of growth indices

Analysis of Growth Indices is used to view the growth of the fisheries GDRP in a given period. To calculate the growth indices is used the following formula [15,16] :

$$GI_i = \left(\frac{Y_{it}}{Y_{i.base}}\right) \times 100$$

Where.

GI_i = The ratio of economic variables to bemeasured

Y_{it} = Economic variables to be measured in a certainperiod

$Y_{i.base}$ = The same economic variable in the baseyear

2.1.2 Analysis of Trade Area Capture (TAC)

Analysis of Trade Area Capture (TAC) to measure the strength of the commodities market fisheries at the same time linkages with socioeconomic indicators such as income and the buying ability society. The TAC formula from fisheries in region A can be formulated as follows [15-16]:

$$TAC_a = \frac{AS_a}{PCS_{base}\left(\frac{PCI_a}{PCS_{base}}\right)}$$

Where,

AS_a = The actual sales value of fisheries commodities in the area "a"
PCS_{base} = Per capita sales of fish products in the base area
PCI_a = Per capita income for the area analyzed
PCI_{base} = Per capita income in the base area

If the numbers obtained from TAC > total population in the area analyzed then it can be said that the number of inhabitants has a pattern of expenditure against fishery products is greater than the base region (e.g. national). Conversely, if TAC < total population then the region lost a potential trade of fishing and has a pattern of spending that is lower than national. TAC measure purchases by residents and also the inhabitants of non-residents.

2.1.3 Analysis of Pull Factor (PF)

Analysis of Pull Factor (PF) aims to measure the strength of interest from the locals would a commodity, in this case, the fish products. Pull Factor (PF) can be calculated using the following formula [15-16]:

$$PF_a = \frac{TAC_a}{P_a}$$

Where,

TAC_a = Trade Area Capture in the area "a"
P_a = Number of population in the area "a"

If the value PF > 1 then market fishery products in A region able to attract customers from other regions. Conversely, if PF< 1 then A region losing customers against markets of the other competitors.

2.1.4 Analysis of Minimum Requirement Approach (MRA)

Analysis of Minimum Requirement Approach (MRA) is used to measure how big strength of the base sector by measuring base multiplier. The Minimum Requirements Approach (MRA) can be formulated as follows [15-16]:

$$X_a^i = \left(\frac{E_a^i}{E_a} - \frac{E_{min\,peer}^i}{E_{minpeer}}\right) E_a^i$$

Where,

E_a = number of workers in the areaa
E^i = number of fisheries workers in the *peer* area
E_i = number of workers in the *peer* area

Calculation of the MRA in this study using a variable workforce (E = Employment) as one of the indicators. The formula above States that the basic employment sectors 'i' (in this case fisheries) in A region is the multiplication of the total labor of the sector "i" in A region with a different share of the fishery sector with share a minimum share of the nearest sector (peer).

3. RESULTS AND DISCUSSION

3.1 The Contribution of Fisheries Sector in Regional Development Analysis of Growth Indices

Growth Indices analysis is used to monitor the growth of GRDP in the Batam City in a certain period. Calculations carried out in this study use the variable Gross Regional Domestic Product (GRDP) of the Batam City based on Constant Prices According to Business Field in 2013 - 2018 as an indicator. Details of the results of the calculation of the Fisheries Growth Index in Batam City can be seen in Table 1.

Table 1. The results of calculation of growth indices at constant price year 2013 – 2018

Batam city GDRP based on constant prices according to bussines field 2013 – 2018				
Year	Fisheries sector GDRP In 2013	Fisheries sector GDRP In 2018	Growth indices	Fisheries sector GDRP
	$Y_{i.\,base}$	Y_{it}	GI_i	(%)
2013	1,019,919,000	1,292,176,682,000	126.694	126.594

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Calculation results from the growth index of Batam City in 2013-2018, obtained a growth index value of 126,694. Details of the GI calculation results can be seen in Table 1. Based on these values it can be concluded that the PDRB of the Batam City fisheries sector has fluctuated, but overall has increased by 126% within six years. The growth index calculation is used GDP data with constant prices on business to eliminate the impact of inflation on regional income. Also, the increase in the GDP of the fisheries sector in the Batam City is allegedly due to the establishment of the Batam City as a growth center which causes a greater concentration of regional development to be carried out in Batam City. This caused significant growth in almost all sectors in Batam City.In addition, an increase in the GDP of the fisheries sector in Batam City is suspected to have occurred the first fishing port in Batam City, namely PT. Hasil Laut Sejati in the Sagulung District was built in 2015, so that in the previous year the fishermen sold their fish directly to the fish market or the black market in the back district of Padang that would be sold to Singapore, so that all fishery products were not recorded by Batam City government.

Previous research by [15-16] produced a GDP growth rate of the fisheries sector in Bogor Regency by 65%. The GRDP growth rate of the fisheries sector in the Bogor Regency is greater than the growth rate of PDRB fisheries in the Batam City. This is presumably because, in the method of calculating the growth index, a study by [16] uses the GRDP of the fisheries sector on the current price according to the business field so that it still gets the influence of inflation. The cause of Bogor Regency's GRDP growth is higher than that of Batam City, allegedly because the number of workers in Bogor Regency is greater, the quantity and quality of investment is better, the population is larger and is located in a large city area (metropolitan)

3.2 Analisis Trade Area Capture (TAC)

The TAC calculation carried out in this study uses the variable value of actual fish sales in Batam City (ASa) which was adopted through the value of fisheries production in Batam City, the per capita value of fish product sales in Riau Islands Province (PCSbase), per capita income in Batam City (PCIa), and per capita income in Riau Islands Province (PCIbase). Based on the results of the TAC calculation of the Batam City fisheries sector in 2013 - 2018, the Batam City's TAC value in 2013 was 1,204,467, then 1,217,777. in 2014, then 1,229,565 in 2015, then 1,287,166. In 2016, then 1,348,008 in 2017, and 1,408,210 in 2018. Details of the TAC calculation results in the Batam City fisheries sector can be seen in Table 2.

TAC calculation results illustrate the number of residents who will buy fishery products, If seen from the calculation results and the average of the fisheries sector TAC in the Batam City in 2013-2018, the fisheries sector TAC in Batam City is greater than the population in Batam City (TAC> Pa), In 2013, the TAC value was greater than the population (1,204,467>1,135,412), then in 2014 the TAC value was greater than the population (1,217,777>1,162,198), then in 2015 the TAC value was greater than the population (1,229,565>1,188,985), then in 2016 the TAC value was greater than the population (1,287,166>1,235,399), then in 2017 the TAC value was greater than the population (1,348,008>1,283,196), and in 2018 the TAC value was greater than the population (1,408,210>1,329,773), So it can be concluded that the fisheries sector of the Batam City can capture the opportunities of trade in fisheries products in other regions, The TAC essentially measures purchases by residents and outsiders, Based on previous research in Bogor Regency by Hasiholan (2018), the TAC value of Batam City and Bogor Regency is greater than the total population, This indicates that Bogor regency and Batam City can capture trade opportunities

Table 2. Calculation result of trade area capture in the Batam City 2013 – 2018

Year	P_a	AS_a	PCS_{base}	PCI_a	PCI_{base}	TAC_a
2013	1,135,412	1,019,919,000	898,28	69,450,420	73,674,056	1,204,467
2014	1,162,198	1,122,011,020	965,42	72,831,022	76,313,802	1,217,777
2015	1,188,985	1,133,233,140	953,109	76,079,802	78,627,141	1,229,565
2016	1,235,399	729,231,399,400	589,802	77,135,055	80,302,287	1,287,166
2017	1,283,196	941,041,044,000	733,357	75,948,483	79,784,514	1,348,008
2018	1,329,773	1,292,176,682,000	971,727	76,749,924	81,277,086	1,408,210
$\bar{x}$	1,222,493					1,282,532

in other regional fishery products, The strengths of the fisheries sector in Bogor Regency are the large number and value of aquaculture production while the advantages of the fisheries sector in the Batam City are the amount and value of large capture fish- eries production, For example, the superior commodity of grouperin the Batam City can capture the opportunities of trade in fisheries products in other regions and even penetrate foreign markets.

3.3 Analisis Pull Factor (PF)

The PF calculation in this study uses the TAC value in Batam City and the population in Batam City, Details of the calculation of the PF value of Batam City in 2013-2018 can be seen in the following Table 3.

The average PF fishery sector in Batam City in 2013-2018 shows that the PF value of the fisheries sector in the Batam City is greater than 1, This is due to the increased contribution of the fisheries sector in the GRDP in the Batam City and the high market demand from other regions for commodities Batam City fisheries, especially fishery products, So it can be concluded that the Batam City can attract customers from other regions or Batam City has a specialization in fishery products, According to [15-16], if the PF value > 1 indicates that the fishery product market in the region can attract customers from

other regions in the vicinity, Conversely, if PF <1 then the region loses customers to other competing markets, Based on previous research by [15-16] the PF value of the Batam City and Bogor Regency is more than 1 (> 1), This means that these two regions can attract customers from other regions, The power to attract better customers is found in Batam City, The main commodity of the fishery which becomes specialization of the Batam City are carp, grouper, and tilapia, This commodity can meet regional demand and attract customers from other regions in Riau Islands Province, outside Riau Islands Province to foreign countries.

3.4 Analisis Minimum Requirement Approach (MRA)

The MRA calculation in this study uses the labor variable (E = Employment) as an indicator, The MRA technique uses areas that have the same characteristics that are used as a reference or peer, In this study, other areas used as a comparison are all districts in Batam City, which amount to 12 districts, namely: Belakang Padang, Bulang, Galang, Sungai Beduk, Sagulung, Nongsa, Batam Kota, Sekupang, BatuAji, Lubuk Baja, BatuAmpar, dan Bengkong districts, Calculation of labor share values between regions is explained in the following Table 4.

Table 3. Calculation results of fisheries sector pull factor 2013 – 2018

Year	P_a	TACa	PF$_a$
2013	1,135,412	1,204,467	1.06
2014	1,162,198	1,217,777	1.04
2015	1,188,985	1,229,565	1.03
2016	1,235,399	1,287,166	1.04
2017	1,283,196	1,348,008	1.05
2018	1,329,773	1,408,210	1.05
$\bar{x}$			1.04

Table 4. Inter–district fisheries sector workforce share in Batam City 2017

District	Total workforce	Total fisheries workforce	Share workforce
Belakang Padang	18,807	4,524	0.2405
Bulang	10,839	4,386	0.4046
Galang	14,832	4,466	0.3011
Sungai Beduk	54,287	328	0.0060
Sagulung	123,748	278	0.0022
Nongsa	54,015	613	0.0113
Batam Kota	117,747	152	0.0012
Sekupang	90,372	334	0.0036
BatuAji	89,184	28	0.0003
Lubuk Baja	57,370	126	0.0021
BatuAmpar	39,022	124	0.0031
Bengkong	76,196	159	0.0020

Table 5. Calculation of minimum requirement approach for inter-district fisheries sector In Batam City 2017

District	Share sector	Minimum shares peer	Total employment sector	Total employment	Basic employment	Basic multiplier
Belakang Padang	0.2405	0.0003	4,524	18,807	4,517.44	4.1
Bulang	0.4046	0.0003	4,386	10,839	4,382.20	2.4
Galang	0.3011	0.0003	4,466	14,832	4,461.46	3.3
Batu Aji	**0.0003**	**0.0003**	**28**	**89,184**	**Reference Region (peer)**	
Sagulung	0.0022	0.0003	278	123,748	235.12	526.3
Nongsa	0.0113	0.0003	613	54,015	594.16	90.9
Batam Kota	0.0012	0.0003	152	117,747	105.97	1,111.1
Sekupang	0.0036	0.0003	334	90,372	298.22	303.03
Sungai Beduk	0.0060	0.0003	328	54,287	309.43	175.4
Lubuk Baja	0.0021	0.0003	126	57,370	103.26	555.5
BatuAmpar	0.0031	0.0003	124	39,022	109.26	357.1
Bengkong	0.0020	0.0003	159	76,196	129.53	588.2

The share value is obtained by comparing the number of fisheries work arrangements with the total workforce in a district, Based on the data obtained it can be seen that the sub-district that has the lowest share value is the BatuAji District, This happens because the number of workers is relatively large in BatuAji District, but the number of fisheries workers is relatively small for the number of workers, Besides that, BatuAji District does not have a sea area so fisheries workers, especially fishermen, tend to be little or nonexistent, The district with the highest share value is the BulangDistrict, This is due to BulangDistrict located on the edge of the beach (sea area) which causes many fisheries workers, especially fishermen, Also, the total labor force that is not too much in the BulangDistrict causes the value of the share of the fisheries sector in the District to be higher, The share value of the BatuAjiDistrict fisheries sector is the lowest so it is used as a peer area, Details of the 2017Batam City District MRA calculation results are explained in the following Table 5.

The data variables obtained in Table 5 can be used to calculate the base multiplier of the fisheries sector which is calculated based on the ratio between the total workforce in the fisheries sector divided by basic employment, Bulang District in the MRA analysis has a basic multiplier value of 2,4, This shows that every 2 workers created by the base sector will produce 0,4 workers in the non- base sector, Or for every 20 workers in the base sector is expected to create 4 workers in the non-base sector, Previous research [20-27], Padang city has a basic multiplier value of 177,6 which shows that every 177 workers in the base sector are expected to be able to produce 0,6 workers in the non-base sector, Based on these data the multiplier effect of Padang City is lower than that of Bulang Subdistrict, this is because Padang City is considered as an area prone to earthquake and tsunami disasters, this is a problem in developing the fisheries sector in Padang City [20-29],

3.5 Aspiration of Fisheries Development in Batam City

The implementation of regional development must be based on a development plan prepared based on the conditions, potential, and capability of the resources owned by the region [30-42]. The Regional Government gives authority to the regions to draw up regional development plans which are an integral part of the national development planning system, Based on the

2016-2021 Batam City RPJMD, several missions will be formulated to be achieved in the development of Batam City, namely:

- Realizing Batam as an International Standard Airport
- Creating Batam City as one of the Centers for National Economic Growth
- Creating a Prosperous Community
- Creating Government, Private and Civil Society

The above mission is a general mission in the medium term to be achieved by the Batam City government Regional development cannot be separated from the aspirations that develop in the community, The Batam City fishing community has its aspirations in developing the Batam City area, Based on the results of interviews with the fishing com-munity, the people's aspirations for the government are:

- Hopes that the government will provide services to the community by the process
- The government is more professional in implementing policies and on target
- Assisting the community in a periodic and scheduled time
- The government must meet frequently with the community in the field to find out complaints from the community

The aspirations of the Batam City community towards the government tend to be non-specific only focused on the obligations that are supposed to and should be carried out by the government and based on the conditions felt by the community [42-48].

4. CONCLUSION

Based on research conducted, it shows that the GDP of the fisheries sector in the Batam City in 2013-2018 has fluctuated, but overall the GDP growth rate of the fisheries sector has increased by 126 %,The value of Trade Area Capture (TAC) of the Batam City in 2013-2018 is always greater than the populationBatam City (TAC> Pa), In 2013, the TAC value was greater than the population (1,204,467>1,135,412), then in 2014 the TAC value was greater than the population (1,217,777>1,162,198), then in 2015 the TAC value was greater than the population (1,229,565>1,188,985), then in 2016 the TAC value was greater than the population (1,287,166>1,235,399), then in 2017 the TAC value was greater than the population

(1,348,008>1,283,196), and in 2018 the TAC value was greater than the population (1,408,210>1,329,773), So it can be concluded that the fisheries sector of the Batam City can capture the opportunities of trade in fisheries products in other regions, The TAC essentially measures purchases by residents and outsiders,The Pull Factor (PF) value of the Batam City fisheries sector in 2013-2018 was more than 1 (PF> 1), This means that Batam City fishery products can attract customers from other regions,The best value of the Basic Multiplier in the Batam City is in Bulang District, which is 2,4, This means that every 20 workers in the base sector, is expected to create 4 workers in the non-base sector Based on these results it is expected that an increase in fisheries production, especially aquaculture in Batam City to be able to compete with Batam City capture fisheries production

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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