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Analysis of Fishery Sectors Linkages Toward Other Sectors In Batubara District of North Sumatera Province, Indonesia

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ABSTRACT

This research aims to analyze the growth rate, and the role of the fisheries sector, also to analyze the linkage between the fisheries sector and other sectors in the economic growth rate in the Batubara district. The results of research can be used by local communities and the government as material consideration in determining a policy of management of the economic sector, especially the fisheries sector. This research was carried out from April 2017 to April 2018. The methods utilized are regional superiority analysis, Klassen typology analysis, and correlation analysis. The results showed that LQ, LI and SI values of the fisheries sector of Batubara District tend to increase in value from year to year and the fisheries sector itself is in a state of growth. Still, Typology Klassen analysis reveals that the fisheries sector of Batubara district is in the second quadrant. This means that it is advanced but depressed. Moreover, the role of the fisheries sector to other sectors is in the provision of production factors and capital base due to the economy factors built-in to the same space. Herein, the result of correlation analysis of the fisheries sector with other sectors is 0.9. This shows that there is a very strong linkage between the fisheries sector and other sector values in the Batubara District.

Keywords: Linkage, growth, fishery, Batubara District

1. INTRODUCTION

In modern conditions of Indonesian development the actual task is to ensure the sustainable development of the regional economy. It requires a study of the concept and entity of sustainable development of the regional economy, of the conditions and factors of its

ensuring. It is no less important to study the relationship between the sustainable development of the regional economy and the economic stability of its systems within the framework of the mechanism of regional economic development, the source of which is the production of the gross domestic regional product (GDRP) [1].

The sustainable development of the regional economy, along with the general laws of development of the national economy is determined by the specific features which are related to the structure of the GDRP, a specific gravity of competitive products of the basic economic industries, including exports to total production in the region, security resource potential income [1, 2].

Development is an important need to be considered by each region to promote and prosper the life of the community [1, 3]. In development of a region, one needs to know the economic resources as potential owned areas, such as natural resources, human resources, financial resources, so they can be known what is the capital and what is the potential for becoming a priority in the development of the area. Development of the region, especially in developing countries, needs to be done sustainable by focusing more on economic development; this is due to the slow growth rate of the economy that should be able to achieve the goals or encourage changes in other areas of life in community [2, 3].

Economic growth is a growth rate formed from various sectors of the economy that indirectly describes the rate of economic growth that occurred. To increase the economic growth in a region, it is important to note the strong sectors in the area so that we can see the flaws and advantages of each sector that may affect each other [1, 4, 5].

The advantages of the fisheries sector that are rarely owned by other sectors and can drive investment both, at national and regional scale, are: (1) rich marine resources (quantity and diversity); (2) high competitiveness; (3) industry in the fishery sector has forward linkages and backward linkages closely to other industries, (4) fishery resources are renewable resources, (5) investment in fisheries sector has efficiency and power for high absorption of labor, and (6) generally, local fishery-based fisheries industry with rupiah inputs, but dollar output [1, 6, 7].

According to [1, 7], the interrelated principles of inter-sectoral will further strengthen development, such as: (1) Inter-sectoral relations in terms of market determination to increase the added value of the products of the sector; (2) The relationship between sectors in optimizing the supply of raw materials; (3) Inter-sectoral relationship with supporting industries; (4) The relationship between the fishery sector and economic sector and other sectors such as transportation sector, service sector, and others.

The purpose of this research is to analyze the growth rate of fishery sector in Batubara District, and to analyze the role of fishery sector to other sectors in Batubara District, and to analyze the relationship between fishery sector and other sectors in economic growth in Batubara District.

2. METHOD

The type of data used throughout this research is quantitative data. Sources of data used in this research are secondary data. The data needed in this research are GDRP (Gross Domestic Regional Product) based on current price, GDRP at constant price, Fishery data of Batubara District, Fishery Data of Batubara District, North Sumatran fishery data, and other secondary data related to the purpose of this research, such as economic growth of Batubara District and

economic growth of North Sumatra. The source of data used comes from the Central Department of Statistics Batubara District and North Sumatra. The analytical methods used in this research are regional superiority analysis, typology classes analysis, and correlation analysis.

2. 1. Location Quotient Analysis (LQ)

Location Quotient analysis model is one of the calculation techniques to know the base and non-base sector by comparing the percentage contribution of the fishery sector. The data used in this research are GDRP based on current price. LQ analysis of the fishery sector in Batubara District can be formulated by the following equation [1, 7]:

$$LQ = \frac{\frac{X_{ij}}{X_j}}{\frac{X_{il}}{X_l}}$$

where:

- LQ: LQ value of sector in Batubara District
- X_{ij}: GDRP of fishery sector in Batubara District
- X_j: GDRP of all sectors in Batubara District
- X_{il}: GDRP of fishery sector in North Sumatra
- X_l: GDRP of all sectors in North Sumatra.

LQ method in this research is focused to know the growth rate of fishery sector which comes from LQ value of the fishery sector. The value of LQ obtained will be analyzed in time-series to know the growth graph of fishery sector based on LQ value.

2. 2. Localization Index Analysis (LI)

Localization Index Analysis (LI) is an analytical technique that shows an activity developing in all regions (dispersion) or relatively developed only in certain areas (localization / concentration). LI analysis of the fishery sector in Batubara District can be formulated by the following equation [7]:

$$LI_j = \frac{1}{2} \sum_{j=1}^n \left\{ \left| \frac{X_{ij}}{X_j} - \frac{X_i}{X} \right| \right\}$$

where:

- L_{ij}: LI value of fishery sector
- X_{ij}: GRDP of fishery sector in Batubara District
- X_i: GRDP of all sectors in Batubara District
- X_j: GDRP of fishery sector in North Sumatra Province
- X: GRDP of all sectors in North Sumatra Province.

LI method in this research, as in LQ method, is also focused to know the growth rate of fishery sector which is seen from LI value of fishery sector. The value of LI obtained will be analyzed in time-series to obtain a growth graph of fishery sector based on LI value.

2. 3. Specialization Index Analysis (SI)

SI analysis is used to categorize that a region has diversified activities or has specialized activities. If a region has diversified activity then the region does not get a straightforward activity, but if the region has specialized activities then the region has certain elementary activity. If the results of analysis have a value close to 0 then the region has numerous activities (diversification), whereas if the analysis results have a value close to 1 then it means that the observed area has a special activity [1, 7]. SI analysis of the fishery sector in Batubara District can be formulated by the following equation [7]:

$$SI_j = \frac{1}{2} \sum_{j=1}^n \left\{ \left| \frac{X_{ij}}{X_i} - \frac{X_j}{X..} \right| \right\}$$

where:

- SI_j: SI value for total sector in Batubara District
- X_{ij}: GDRP of fishery sector in Batubara District
- X_i: GDRP of all sectors in Batubara District
- X_j: GDRP of fishery sector in North Sumatera Province
- X...: GDRP of all sectors in North Sumatera Province.

The analysis of SI in this research, as in LQ and LI analysis, is focused on knowing the growth rate of the fishery sector seen from the value of SI of the fishery sector. The value of SI obtained will be analyzed in time-series to obtain the growth graph of fishery sector based on SI value.

2. 4. Klassen Typology Analysis

Klassen typology is used to identify the economic sector position of Batubara District by taking into account the economic sector of North Sumatera as a reference area [1, 7]. In the Sectoral Klassen Tipologi Analysis [7], there are 4 (four) sectoral categories divided into 4 quadrants: The first quadrant is a fast growing and growing sector ($g_i > g_n$, $s_i > s_n$). The second quadrant is an advanced but depressed sector ($g_i < g_n$, $s_i > s_n$). The third quadrant is a potential sector or can still grow rapidly ($g_i > g_n$, $s_i < s_n$). The fourth quadrant is occupied by a sector which is relatively left behind ($g_i < g_n$, $s_i < s_n$).

where:

- g_i : average growth rate of observation area
- g_n : average growth rate of comparison area
- s_i : average contribution of observation area
- s_n : average contribution of comparison area.

2. 5. Correlation Analysis

Correlation analysis is used to identify the degree of linear relationship between one variable with other variables. The rationale of Moment Product correlation analysis is the change between variables. It means that if the change of a variable is followed by another variable change then the two variables are correlated [7, 8]. Correlation analysis of the fishery sector with others in Batubara District can be formulated by the following equation [8]:

$$r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

where:

- rx_y: coefficient of Moment Product correlation
- n: number of observations (number of year observation)
- ΣX: the number of X value measures (GDRP of the fishery sector)
- ΣY: the number of Y value measures (other sector GDRP).

3. RESULTS AND DISCUSSION

Batubara District gets a new District which originated from the of Asahan region in 2007. Geographically, Batubara district is located on the East Coast Region of North Sumatra. Climate in the area of Batubara District is a tropical climate with an average rainfall of 1,702 mm /year. The average growth of GDRP value, founded on the constant prices and at current prices in Batubara district, is 4.61% and 9.31% each other [9, 10]. Graph of economic growth, based on the value of GDRP in Batubara district, can be seen in **Figure 1**.

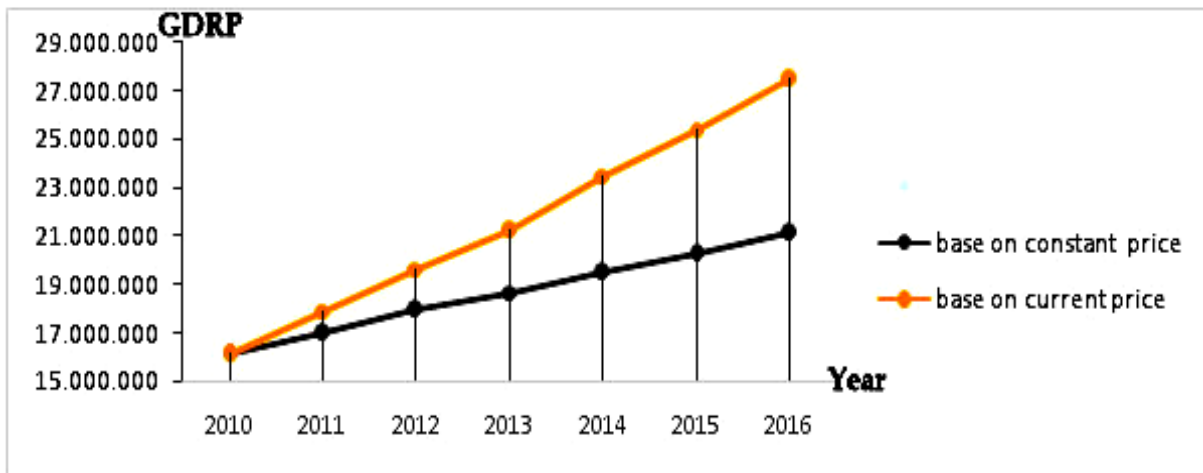


Figure 1. Graph of GDRP based on Constant Price and At Current Price in Batubara District 2010-2016 [9, 10]

3. 1. Growth of Fishery Sector in Batubara District

a) LQ Analysis

The fishery sector that incorporated with agriculture and forestry sectors in the GDRP of Batubara District cannot be said to be the basic sector, because the LQ value is not more than 1. This is different if the fishery sector based on GDRP of a fishery which is not combined with agriculture and forestry sector, which is getting LQ value more than 1 and it can be said as the basic sector and potential to be developed in Batubara District. The growth of the fishery sector in Batubara District can be described by LQ value of the fishery sector. The result of LQ value of the fishery sector is presented in time-series so that it can be seen the growth graph of the fishery sector in Batubara District. Based on **Figure 2** it is known that since 2010-2016 the LQ value of the fishery sector of Batubara District had 2 (two) times, the decrease that was in 2012 and year 2015. Despite decreasing, LQ value of the fishery sector of Batubara District still has the value more than 1. Graph of the fishery growth sector in Batubara District can be seen in Figure 2.

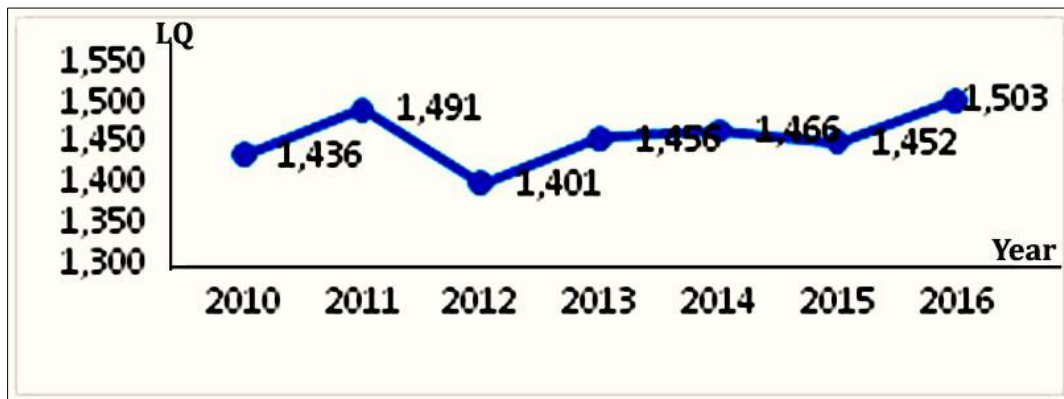


Figure 2. LQ Values Graph of Fishery Sector in Batubara District in 2010-2016

b) LI Analysis

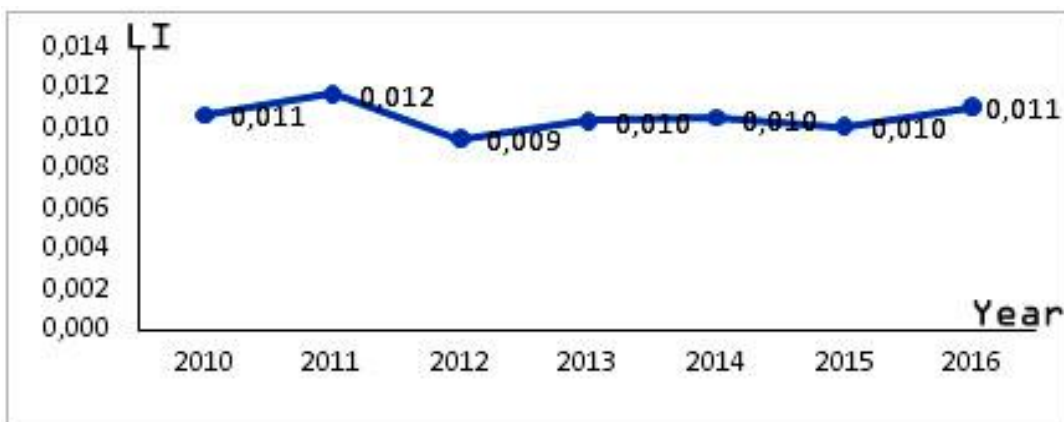


Figure 3. LI Values Graph of Fishery Sector in Batubara District in 2010 – 2016

The fishery sector, which is part of the agriculture and forestry sector in GDRP of Batubara District, cannot be distributed to concentrate in one region because the value of LI obtained is negative. When the GDRP of the fishery sector is kept separated from agriculture and forestry sector, the value of fisheries sector LI is 0.01. This indicates that the fishery sector offers the opportunity to be developed, centered in the area of Batubara District. The growth of the fishery sector in Batubara District, described by the value of LI which is presented in time-series, is known that since 2010-2016 the value of LI fishery sector of Batubara District has 2 (two) decreases, in 2012, and 2015. Despite decreasing, the value of LI fishery sector of Batubara District remains valued at 0.01. The growth graph of the fishery sector in Batubara District, based on LI value, can be seen in **Figure 3**.

c) SI Analysis

Specialization Index analysis is usually used to refer to a region based on the specific activities that exist in the region. Region with the value of SI close to 0 does not have a restricted activity, while the value of SI close to 1 then the region has a specificity. SI value in the Batubara district is between 0.00-0.01, it means the value less than one. Accordingly, that the Batubara District does not have activity from the specialized sector. All sectors in the Batubara District are dispersed, and no sector is already too dominant. The growth of the fishery sector of Batubara District, described by SI value that presented in time-series, has 2 (two) times the decrease that was in 2012 and year 2015. Despite decreasing, the value of SI fishery sector of Batubara District is 0.004-0.006. The growth graph of the fishery sector in Batubara District, based on SI value, can be seen in **Figure 4**.

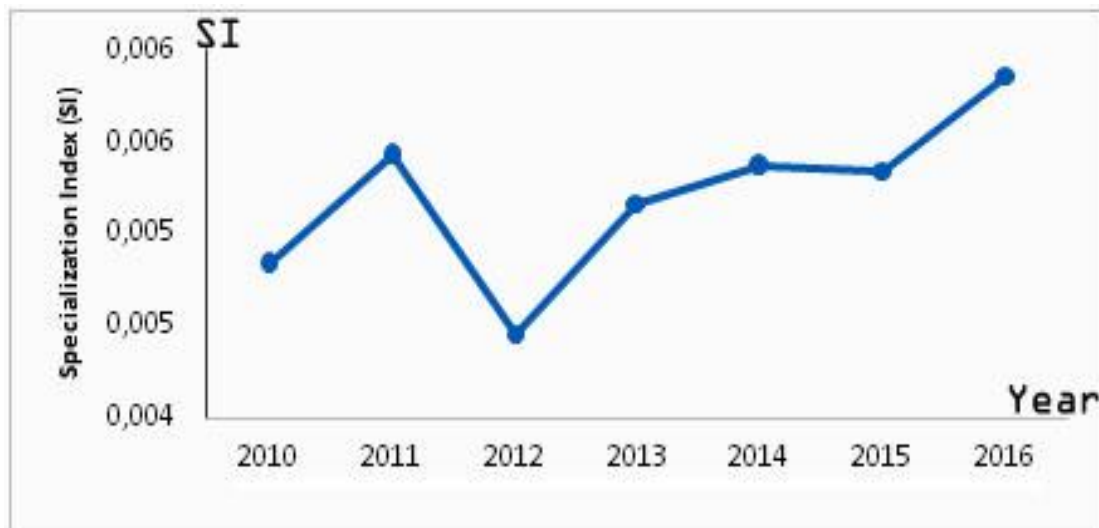


Figure 4. SI Values Graph of Fishery Sector in Batubara District in 2010-2016

3. 2. Klassen Typology Analysis

Sector with the highest average growth rate for GDRP in Batubara District is the services sector with an average growth rate of 13.42% (**Table 1**). Sector with the least growth rate to GDRP of Batubara District is electricity and gas procurement sector with an average growth

rate of 5.28%. Sector that gives the biggest contribution to the GDRP of Batubara District is the manufacturing sector, with an average contribution of 48.85%. Sector that sets the smallest contribution to GDRP of Batubara District is waste management, waste and recycling sector of 0.05%. Sector that has the highest average growth rate to GDRP of North Sumatra Province is mining and quarrying sector, with an average growth rate of 17.22%. Sector that has the least growth rate to GDRP of North Sumatra Province is electricity and gas procurement sector, with an average growth rate of 4.73%. Sector that gives the largest contribution to GDRP of North Sumatra Province is agriculture and forestry sector, with an average contribution of 21.34%. Sector that gives the smallest contribution to GDRP of North Sumatra Province is waste management, waste and recycling sector which is 0.10%.

Table 1. Matrix of Klassen Typology of Batubara District Sectors

Quadrant I Progressing sectors and growing rapidly ($g_i > g_n, s_i > s_n$)	Quadrant II Progressing sectors but depressed ($g_i < g_n, s_i > s_n$)	
	<ul style="list-style-type: none"> • Fishery • Manufacturing 	
Quadrant III Potential sector or still can grow rapidly ($g_i > g_n, s_i < s_n$)	Quadrant IV Relatively left behind sectors ($g_i < g_n, s_i < s_n$)	
<ul style="list-style-type: none"> • Procurement of Electricity and Gas 	<ul style="list-style-type: none"> • Agriculture and Forestry • Mining and Quarrying • Water Supply, Waste Management, waste, and recycling • Construction • Large and Retail Trade; Car and Motorcycle Repair 	<ul style="list-style-type: none"> • Transportation and Warehousing • Provision of Accommodation and Foods • Information and Communication • Financial Services and Insurance • <i>Real estate</i> • Company Services • Administration of Government, Defense, and Mandatory Social Security • Educational Services • Health Services and Social Activities • Other Services

The fishery sector of Batubara District has an average growth rate of 6.65% and contributes to the GDRP of Batubara District at 3.34%. The growth rate of the fishery sector in North Sumatra Province is 12.21% and has an average contribution of 2.28%. It means that the growth rate of the fishery sector in Batubara District is not greater than the growth rate of the fishery sector in North Sumatra Province, but the contribution of the fishery sector in Batubara District is bigger than the contribution of the fishery sector of North Sumatra Province. Therefore the fishery sector is in the second quadrant of the Klassen typology matrix which

means that the fishery sector of Batubara District is classified into advanced but depressed sector. The fishery sector of Batubara District has the potential to be developed and contributes to increase the economic growth of Batubara District, but the progress of the fishery sector in Batubara District is also followed by the pressure that threatens the development of the fishery sector in Batubara District. This pressure may come from the internal fisheries sector, such as by a decline in the stock of Fishery Resources, as well as from external fisheries sector, such as pressure from other sectors that are also experiencing growth. Pressure from other sectors can be because of the backwash effect. Backwash effect is the adverse effect arising from the emergence of growth poles, where there is a polarization of economic activity due to the agglomeration. Labor migration, capital, and trade become emerging competition between sectors that are both progressing [10-17].

The fishery sector is acting indirectly in other sectors in the Batubara District. The most likely role is the profit from economic activities in the fisheries sector, that can be used to help develop other sectors. The activity of Fishery economics that built-in Batubara district has the same space as other sectors, it means that the production factor and the main capital of each sector will be influenced by the role of the fishery sector to the regional income.

3. 3. Linkage Analysis

The correlation value of the fishery sector with other sectors in Batubara District is 0.9%. According to [18-23], if the correlation value is close to 1, it means the correlation between variables is said to be very strong. Table results of correlation analysis of the fisheries sector with other sectors can be seen in **Table 2**.

There are four media that support the linkage between fisheries sector with other sector in Batubara District, that is product linkage, consumption linkage, investment linkage, and fiscal relation. These four media linkages can be classified into 2 (two) classes based on the object of linkage, namely the object of fishery products and the objects of profit from the fishery products management. Media that classified to the linkage of fishery object is product and consumption linkage, while media that classified to the linkage of profitable object of the fishery product management are investment and fiscal linkage. The linkage of products and consumption of the fishery sector to other sectors can be seen from the increasing fishery production chart which means that fishery products are used well enough by the uninterrupted society, as well as other sectors. Investment and fiscal linkages of the fishery sector to other sectors in Batubara District can be seen from the contribution of the GDRP of the fishery sector to the GDRP of the District of Batubara, as well as the role of fishery sector based on Klassen typology that indicates that the income from the fishery sector can be used to help increase the growth of other sectors. The fishery sector of Batubara District is known to have strong linkages to other sectors (Table 2); this can occur because in the effort to make the fishery sector as a sustainable Resource needs other components that can be obtained from the management of other sectors. These components, according to [22-25], include: (1) Ecology: exploitation rate, recruitment diversity, changing size of catchment, discard and by catch and primary productivity; (2) Economy: the contribution of fisheries to GDRP, employment, ownership, subsidy and alternative income; (3) Social: population growth, conflict status, education level, and environmental awareness; (4) Technology: duration of trip, landing site, selectivity of fishing gear, FAD, ship size and side effects of fishing gear; (5) Ethics: equality, illegal fishing, habitat mitigation, mitigation of ecosystems and attitudes towards waste and by catch [1-3, 24-37].

Table 2. Correlation Analysis Values of the Fisheries Sector with Others

Other sectors	Correlation value of fishery sector
Agriculture and Forestry	0.968
Mining and quarrying	0.994
Manufacturing	0.995
Procurement of Electricity and Gas	0.977
Water Supply, Waste Management, Waste and Recycling	0.992
Construction	0.994
Large and Retail Trade; Car and Motorcycle Repair	0.997
Transportation and Warehousing	0.981
Provision of Accommodation and Foods	0.996
Information and Communication	0.988
Financial Services and Insurance	0.994
Real Estate	0.999
Company Services	0.997
Administration of Government, Defense and Mandatory Social Security	0.996
Educational Services	0.996
Health Services and Social Activities	0.996
Other services	0.997

4. CONCLUSIONS

The result of this research indicates that:

- 1) The results of LQ, LI, and SI analyses show that the fishery sector tends to increase the value from year to year
- 2) The result of Klassen Typology analysis shows that the fishery sector of Batubara District, classified in the second quadrant which means the fishery sector of Batubara District is an advanced but depressed sector. The role of the fishery sector to other

sectors is in the provision of production factors and capital base because the economy built is used by the same space

- 3) The result of correlation analysis of the fishery sector with other sectors is 0.9. This shows that there are a very strong linkage between the fishery sector and other sectors in the Batubara District.

References

- [1] Rizal A., Suryana A.A.H., Herawati H., Lantun P.D., and Izza M.A., Regional Perspective To Build Competitiveness For Indonesian Fishery Sector In The Global And Autonomy Regime. *Int. J. Agric. Env. Res.* Vol 3 (6) (2017) 4368-4388
- [2] Rizal A. and Nurruhwati I. Study on balance of urban datum land price among cities based on gis platform, in sumedang district of west java province of indonesia. *International Journal of Scientific & Engineering Research* Vol 9 (3) (2018) 1081-1085
- [3] Rizal A., Subiyanto, Juahir H., and Lananan F. Freshwater Governance on Limboto Lake in Gorontalo Province of Indonesia. *Indian Journal of Public Health Research & Development*, Vol 10 (4) (2019) 823-828.
- [4] Syaifuddin and Rizal A. The Influence of Corporate Communication Strategy and Customer Value Creation Toward Creation of Reputation (Case Study at Len-Indonesian State Owned Company). *World Scientific News* 105 (2018) 62-73
- [5] Rizal A. Science and policy in the coastal zone management. *World News of Natural Sciences* 21 (2018) 1-8.
- [6] Rizal A., Herawati H., Zidni I., Izza M.A., and Ismail M.R. The role of marine sector optimization strategy in the stabilisation of Indonesian economy. *World Scientific News* 102 (2018) 146-157.
- [7] Rizal A., Kusumartono F.X.H., and Zaida. Analysis of Fisheries Sector Contribution in Nabire District of West Papua Province. *Scientific News of Pacific Region 2* (2019) 1-14
- [8] Rizal A. and Nurruhwati I. Analysis of the effect of city growth on The development of hinterland region In Cianjur Regency. *World Scientific News* 115 (2019)
- [9] Batubara District Central Bureau of Statistics. 2017. Batubara District in numbers. Batubara District
- [10] Development Planning Agency of Batubara District. 2017. Batubara District Spatial Plan 2012-2031. Batubara District.
- [11] Rizal A. and Nurruhwati I. Study on balance of urban datum land price among cities based on gis platform, in sumedang district of west java province of indonesia. *International Journal of Scientific & Engineering Research* Vol 9 (3) (2018) 1081-1085
- [12] Randall A. Kramer, Sahat M.H. Simanjuntak, and Christopher Liese. Migration and Fishing in Indonesian Coastal Villages. *AMBIO: A Journal of the Human Environment*, 31(4), 367-72. (1 June 2002). <https://doi.org/10.1579/0044-7447-31.4.367>

- [13] Hickman, R. and Hall, P., 2008. Moving the city east: explorations into contextual public transport-orientated development. *Plan. Pract. Res.* 23 (3), 323–339. <http://dx.doi.org/10.1080/02697450802423583>
- [14] Hull, A., 2009. Implementing innovatory transport measures: what local authorities in the UK say about their problems and requirements. *Eur. J. Transp. Infrastruct. Res.* 9, 202–218
- [15] Janin Rivolin, U., 2017. Global crisis and the systems of spatial governance and planning: a European comparison. *Eur. Plan. Stud.* 25 (6), 994–1012. <http://dx.doi.org/10.1080/09654313.2017.1296110>
- [16] Kamruzzaman, M., Baker, D., Washington, S., and Turrell, G., 2014. Advance transit oriented development typology: case study in Brisbane, Australia. *J. Transp. Geogr.* 34, 54–70. <http://dx.doi.org/10.1016/j.jtrangeo.2013.11.002>
- [17] Knowles, R.D., 2012. Transit oriented development in Copenhagen, Denmark: from the finger plan to Ørestad. *J. Transp. Geogr.* 22, 251–261. <http://dx.doi.org/10.1016/j.jtrangeo.2012.01.009>
- [18] Legacy, C., Curtis, C., and Sturup, S., 2012. Is there a good governance model for the delivery of contemporary transport policy and practice? An examination of Melbourne and Perth. *Transp. Policy* 19, 8–16. <http://dx.doi.org/10.1016/j.tranpol.2011.07.004>
- [19] van Lierop, D., Maat, K., and El-Geneidy, A., 2017. Talking TOD: learning about transit-oriented development in the United States, Canada, and the Netherlands. *J. Urban.* 10 (1), 49–62. <http://dx.doi.org/10.1080/17549175.2016.1192558>
- [20] Lin, J.-J. and Li, C.N., 2008. A grey programming model for regional transit-oriented development planning. *Pap. Reg. Sci.* 87 (1), 119–138. <http://dx.doi.org/10.1111/j.1435-5957.2007.00146.x>
- [21] Maulat, J., Krauss, A., 2014. Using contrats d'axe to coordinate regional rail transport, stations and urban development: from concept to practice. *Town Plann. Rev.* 85 (2), 287–311. <http://dx.doi.org/10.3828/tpr.2014.18>
- [22] Rizal A., Herawati H., Lantun P.D., and Izza M.A. Bumpy Road to Understanding Transaction Cost and Fisheries Co-Management. *World Scientific News* 124 (2) (2019) 252-263
- [23] Milakis, D. and Vafeiadis, E., 2014. Ado(a)pting the transit-oriented development model in the Greek urban and transport contexts. *Plan. Pract. Res.* 29 (5), 471–491. <http://dx.doi.org/10.1080/02697459.2014.893952>
- [24] Nadin, V. and Stead, D., 2008. European spatial planning systems, social models and learning. *Plan. Rev.* 44 (172), 35–47. <http://dx.doi.org/10.1080/02513625.2008.10557001>
- [25] Pagliara, F. and Papa, E., 2011. Urban rail systems investments: an analysis of the impacts on property values and residents' location. *J. Transp. Geogr.* 19 (2), 200–211. <http://dx.doi.org/10.1016/j.jtrangeo.2010.02.006>
- [26] Pettersson, F. and Frisk, H., 2016. Soft space regional planning as an approach for integrated transport and land use planning in Sweden – challenges and ways forward.

- Urban Plann. Transp. Res.* 4 (1), 64–82.
<http://dx.doi.org/10.1080/21650020.2016.1156020>
- [27] Rizal A., Junianto, Sahidin A., and Zaida. Risk Analysis of Trans Papua Corridor Road Infrastructure Development in West Papua and Papua Province of Indonesia. *World Scientific News* 126 (2019) 261-275
- [28] Rizal A., Nurruhwati I., and Khan A.M.A. Economic Contribution of Southern West Java Province Marine Fisheries. *World Scientific News* 119 (2019) 204-217
- [29] Rizal A. Reformulation of Regional Development Strategy To Strengthen Marine Sector in West Java, Indonesia. *World Scientific News* 107 (2018) 207-215
- [30] Rizal A. and Nurruhwati I. Contribution of Human and Capital Toward Regional Economic Growth of Garut District of West Java Province of Indonesia. *Global Scientific Journal*. Vol 6 (5) (2018) 172-179
- [31] Dedi SupriadiAdhuri, Laksmi Rachmawati, Hirmen Sofyanto, and Natasha Hamilton-Hart. Green market for small people: Markets and opportunities for upgrading in small-scale fisheries in Indonesia. *Marine Policy* Volume 63, January 2016, Pages 198-205.
<https://doi.org/10.1016/j.marpol.2015.03.021>
- [32] Alexander M.A. Khan, Tim S. Gray, Aileen C. Mill, and Nicholas V.C. Polunin. Impact of a fishing moratorium on a tuna pole-and-line fishery in eastern Indonesia. *Marine Policy* Volume 94, August 2018, Pages 143-149.
<https://doi.org/10.1016/j.marpol.2018.05.014>
- [33] Fayakun Satria, Lilis Sadiyah, Agustinus Anung Widodo, Chris Wilcox, Jessica H. Ford, and Britta Denise Hardesty. Characterizing transshipment at-sea activities by longline and purse seine fisheries in response to recent policy changes in Indonesia. *Marine Policy* Volume 95, September 2018, Pages 8-13.
<https://doi.org/10.1016/j.marpol.2018.06.010>
- [34] Richard J. Stanford, Budy Wiryawan, Dietriech G. Bengen, Rudi Febriamansyah, and John Haluan. Exploring fisheries dependency and its relationship to poverty: A case study of West Sumatra, Indonesia. *Ocean & Coastal Management* Volume 84, November 2013, Pages 140-152. <https://doi.org/10.1016/j.ocecoaman.2013.08.010>
- [35] S.J.M. Blaber, C.M. Dichmont, W. White, R. Buckworth, L. Sadiyah, B. Iskandar, S. Nurhakim, R. Pillans, R. Andamari, and Dharmadi, Fahmi. Elasmobranchs in southern Indonesian fisheries: the fisheries, the status of the stocks and management options. *Reviews in Fish Biology and Fisheries* September 2009, Volume 19, Issue 3, pp 367–391. <https://doi.org/10.1007/s11160-009-9110-9>.