Spatial Investment Attractiveness Analysis for Regional Economic Development of Sumatera Selatan Province in 2010-2016

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ABSTRACT

Invesment attractiveness in Sumatera Selatan Province is interesting to be observed because it will make economic growth increased. As we know that distribution of investment in Indonesia was not same in many regions. Java and Bali island are known as majority location of investment. This study will determine what is the most significantly determinants that influence of investment in Sumatera Selatan Province, and how spatial effect influence the investment in this region. As proxy of investment of the region, this study take gross fixed capital formation. This study used of panel regression model and Geographically Weighted Regression (GWR) model for analysis. The results of this study, the Human Development Index, GDRP per capita, and quantity of labour have significantly influence of investment in Sumatera Selatan Province. The elasticity of Human Development Index (HDI) influence for investment as positively at 3.699 percent. The Elasticity of Gross Domestic Regional Product (GDRP) per capita influence for investment as positively at 0.933 percent. And the elasticity quantity of labour influence for investment as positively at 0.844 percent. Spatially, every region has a model of investment that weighted of location. The results of GWR model showed that determinants of investment influenced of investment in every district of Sumatera Selatan Province with different significantly.

Keywords : Investment, Gross Fixed Capital Formation, Human Development Index, GDRP Per Capita, Geographically Weighted Regression.

I. INTRODUCTION

Every region in Indonesia realizes that in order to speed up the development process in their respective regions, there are not enough funds needed. Local governments are faced with a dilemma in making difficult policy decisions. On the one hand there is a desire to build by using the potential of the region itself without relying on the central government through regional autonomy. However, most regions experience limited capacity in terms of funding to finance development. Funding sources that can be an alternative to realize sustainable development in the region can be done by attracting investment both domestic and foreign. Regional investment in Indonesia is still focused on Java, which is equal to 60 percent (Kurnia, 2015). This indicates that there is no equitable distribution of investment between regions in Indonesia.

Juanda et al. (2017) in a study entitled "The Fiscal Transfer Effect on Regional in Equality" presented in the sixth IRSA in Manado stated that one of the factors contributing to the ineffectiveness of transfer

funds in overcoming inequality between regions in Indonesia was the tendency to invest private and domestic investment concentrated in Java and Bali.

Investment is one of the efforts of the regions, especially districts / cities to accelerate economic development with decentralization in place. Between districts / cities each seeks to increase their regional investment through various promotions. However, the formation of investment in an area takes place continuously and is influenced by many aspects. Regions are required to have the ability to create a conducive climate and conditions for investors in carrying out their business activities.

South Sumatra Province is one of the provinces in Indonesia with abundant mining and plantation products, such as coal, oil palm and rubber. In 2018, South Sumatra Province, whose capital is Palembang, is the host of a major event for the ASIAN Games 2018 which was held in two cities, Palembang and Jakarta. This does not rule out the possibility, the arrival of foreign nationals to the city of Palembang will have an impact on the flow of investment to the regions (districts / cities) in the region of South Sumatra Province.

The Investment Coordinating Board (BKPM) recorded the realization of Foreign Investment (PMA) in the first quarter of 2016 amounting to Rp. 96.1 trillion, up by 17.1 percent from 82.1 trillion (Sibarani, 2016). However, this achievement is considered still lower than other regions on Java, such as DKI Jakarta, West Java and Banten.

In essence, investment is defined as spending to buy capital goods and production equipment to increase the ability to produce goods and services in the economy. The increase in the number of capital goods has an impact on the economy will produce more goods and services in the future. In line with this thinking, Mankiw (2006) defines investment as goods purchased for future use.

In macroeconomic theory, the Solow growth model is designed to show how the growth of capital stocks, labor force growth, and technological advances interact in the economy, and how they affect the output of goods and services of a country as a whole (Mankiw, 2006). The Solow model simplifies the assumption that there is only one type of capital. But in the real world there are various types of capital, namely human capital, physical capital, social capital.

In one component forming the Gross Regional Domestic Product (GRDP), investment is a dominant component in driving regional economic growth. Regional investment in this case is reflected by Gross Fixed Capital Formation (PMTB). According to the 2008 System of National Account (SNA), PMTB is defined as the amount of addition and reduction of fixed capital goods for the needs of production activities in an economic activity within a certain period of time. The definition of investment includes activities concerning the procurement, manufacture and purchase of new capital goods from within the country and new or used capital goods from outside the country / region. Goods categorized as capital goods are goods that have an element of usage one year or more, and what is meant by use is the use of these capital goods as a fixed tool in the production process.

Previous research on the analysis of factors that influence regional investment has been carried out by Imelda (2006) in his research entitled Analysis of Determinants of Regional Investment Attractiveness and Its Relationship to Regional Economic Development. Haryadi (2010) in his research entitled Analysis of Investment Attractiveness in Jambi Province. Yana Tatiana (2015) in her research entitled Analysis of Regional Development and Investment in Bengkulu Province. Study of the Regional Autonomy Implementation Monitoring Commission (KPPOD) (2003), Raszkwoski (2016), and Urbaniak, Swierkocki, and Tomasz (2018) in their study entitled

Determinant of Atractiveness of Polish Special Economic Zone.

Investment is one component that can increase economic growth. Investment is a form of capital accumulation, namely human capital, social capital, and physical capital. The tendency to be invested by the government in an area because of the demand to advance the region that is still underdeveloped through the construction of adequate infrastructure. Whereas investment by the private sector was driven earlier by the availability of adequate infrastructure. District / city investment through PMTB (Gross Fixed Investment) as an indicator of physical investment indicators invested by both the private sector and the government. This attracted the attention of researchers to analyze whether the factors that influence investment in regencies / cities in South Sumatra Province in 2010-2016. Differences in the characteristics of geographic regions in South Sumatra Province are thought to affect the distribution pattern of investments in the region.

The objectives of this study are:
1. Analyzing factors that influence investment during the period 2010-2016 in the Province of South Sumatra
2. Analyzing the spatial influence between regions in influencing investment in South Sumatra Province
3. The hypotheses to be tested in the study are as follows:
4. The HDI variable is expected to have a positive effect on investment.
5. Variables GRDP per capita has a positive effect on investment.
6. The variable number of workers has a positive effect on investment.
7. Variable length of road relative to area has a positive effect on investment.
8. The variable percentage of investment credit interest has a negative effect on investment.

II. METHODS AND MATERIAL

2.1 Data Source and Text Mining

The data used in this study are secondary data sourced from the Central Statistics Agency (BPS) and Indonesian Financial and Economic Statistics, Bank Indonesia (SEKI, BI) during the period of 2010-2016 as many as 15 definitive districts / cities in South Sumatra Province. Data is transformed in the form of natural logarithms to equalize units, except variables in units of percentages. Analysis was carried out on 15 definitive districts / cities in South Sumatra Province during 2010-2016 namely Ogan Komering Ulu district, Ogan Komering Ilir, Muara Enim, Lahat, Musi Rawas, Musi Banyuasin, Banyuasin, South OKU, East OKU, Ogan Ilir, Empat Lawang, Palembang, Prabumulih, Pagar Alam and Lubuk Linggau.

TABLE 2. DETAILS OF THE VARIABLES USED IN THIS STUDY

Variable	Unit	Data Source
Investment	Million Rupiahs	BPS
Human Developme Index (HDI)	Index	BPS
GDRP per capita	Million Rupiahs	BPS
Labour	Orang	BPS
Relative path lengt	Km/Km²	BPS
Investment credit Interest rate	Percentage	SEKI, BI

2.2 Panel Data Regression analysis and geographically weighted regression

The methode of this study used regression panel data analysis and geographiclly weighted regression.

Details of variables used in this study panel data is data obtained from cross section data which is observed repeatedly in the same individual unit at different times. The representation of the panel data model is as follows:

$$Invesment_{it} = \alpha + \beta_1 HDI_{it} + \beta_2 GRDP\ per\ capita_{it} + \beta_3 Labour_{it} + Relative\ Path\ Lenght_{it} + \beta_5 Invesment\ credit\ interest\ rate_{it} + u_{it}$$

The second analysis uses spatial econometric modeling, which first analyzes the spatial influence and then models it in a geographically weighted regression

Indications of spatial autocorrelation can be used by examining the effect of spatial patterns namely Moran's I (Moran Index) or by Local Indicator of Spatial Autocorrelation (LISA).

The results of the Moran or LISA Index test as a sign of spatial influence and then proceed to the analysis with Geographically Weighted Regression (GWR) modeling if there are indications of the influence of spatial correlation.

Figure 1. Development of PMTB Realization in 2010-2016

III. RESULTS AND DISCUSSION

A. Economic Overview of South Sumatra Province

Regional investment seen from Gross Fixed Capital Formation (PMTB) in the period 2010-2016 in South Sumatra Province has increased. Figure 1 shows the development of district / city PMTB realization in South Sumatra Province. From the description presented, it can be seen that Palembang City has the largest PMTB realization compared to other regions in South Sumatra Province from 2010-2016. If comparing several regencies / cities in South Sumatra Province, the biggest potential for investment is in the city of Palembang. This is because there are many medium-sized large industrial companies in the city of Palembang, namely 69 units with a workforce of 15.4 thousand people. Followed later by Lubuk Linggau City which has 10 units of medium-sized large industrial companies with a total workforce of 344 people (BPS, 2017). Whereas the City of Pagar Alam is the region with the lowest realization of PMTB compared to other districts / cities.
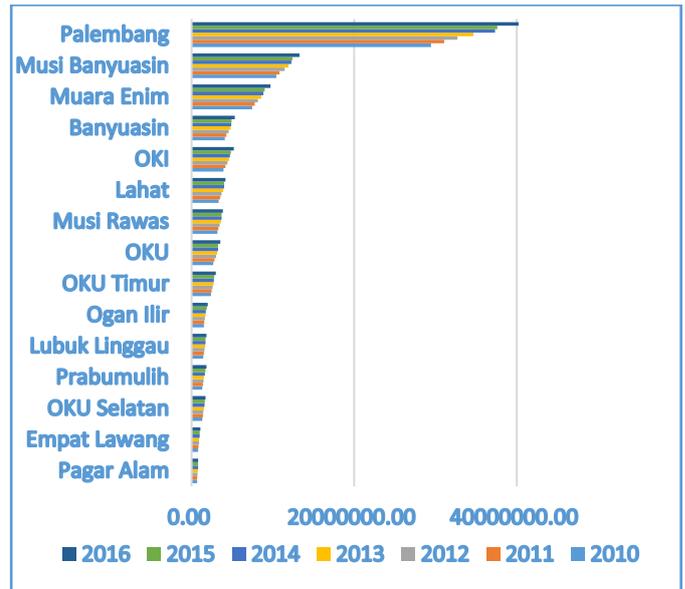
An overview of the development of HDI and its components in South Sumatra Province during the period 2010-2016, in general the HDI of South Sumatra Province experienced an increasing trend. This certainly illustrates the increasing welfare of the people of South Sumatra during this period. The four components of the South Sumatra HDI showed an increase, namely life expectancy increased from 68.34 years in 2010 to 69.16 years in 2016. This reflects the increasing health status of the people of South Sumatra in that period. The educational aspect represented by two components, namely the old school expectations and the average length of school also shows an increasing trend during the period 2010-2016. The last aspect of the economic aspect also shows an increase in the purchasing power of the people of South Sumatra in the period 2010-2016.

Furthermore, if seen between districts / cities in South Sumatra, in 2016 there were only three districts / cities whose HDI values were above the value of the HDI of South Sumatra and all three were Palembang City (76.59), Prabumulih City (73.38), and Lubuk Linggau City (73.57). While the other 12 (twelve) districts / cities are below the value of the South Sumatra HDI. By looking at the value of the South

Sumatra HDI that is not in the middle, it can be concluded that the development in South Sumatra is not evenly distributed. Ideally the value of the South Sumatra HDI is in the middle, namely the proportion of districts / cities with HDI values above the South Sumatra HDI is the same as the proportion of districts / cities with HDI values under the HDI of South Sumatra. Districts / cities with HDI values that are very far from the value of South Sumatra HDI need more attention in terms of development, especially in the fields of health, education and the economy. It is seen that the two districts with the lowest HDI are new districts resulting from regional expansion, namely South OKU Regency (63.42), and Empat Lawang District (64). South OKU Regency and Empat Lawang are new districts resulting from regional expansion.

B. Analysis of Factors Affecting Investment

The chow test results are used to select the best model between Fixed Effect Model and Pooled Ordinary Least Square (POLS) through Redundant Fixed Effect showing a significant probability value, so in this case the Fixed Effect Model (FEM) model is a better model, then done also the Hausman Test (Hausman Test) to choose the best model between FEM and Random Effect Model (REM). From the results of the Hausman test, it was found that with a significant probability value with p-value 0.0046, the conclusion is that the FEM model is the best model.

In the output of both the POLS and FEM modeling, it was found that the chosen model was the FEM model. The independent variables that have a positive effect on investment are GDP per capita, HDI, labor, while the modeling obtained 2(two) independent variables that do not significantly affect investment, namely the length of the road relative to the area and the percentage of the interest rate on investment loans.

The model used in estimating the factors that influence investment in South Sumatra province can be presented as follows:

$$Invesment_{it} = -26.86042 + 3.699774 \ HDI_{it} + 0.933351 \ GRDP \ per \ capita_{it} + 0.883930 \ Labour_{it} + 0.005528 \ Relative \ Path \ Lenght_{it} - 0.010311 \ Invesment \ credit \ interest \ rate_{it} + u_{it}$$

The elasticity of GRDP per capita has a positive effect on investment of 0.933. This means that when an increase of one percent of GRDP per capita will increase the investment value by 0.933 percent. The HDI elasticity has a positive effect on investment of 3.70, so this means that when a one percent increase in the HDI will increase the investment value by 3.699 percent. While variables that also significantly affect investment are labor variable elasticity. The variable labor elasticity has a positive effect on investment of 0.884. This means that when there is an increase of one percent of the workforce, it will increase the investment value by 0.884 percent. This result is in line with previous research conducted by Rini (2015) and Imelda (2006) which states that investment has a positive and significant effect on labor variables. Likewise with the per capita GRDP and HDI variables that have a positive effect on investment, this is in line with research conducted by KPPOD (2003), Tambunan (2005), and Tatiana (2015).

The other two variables, namely the length of the road is relatively positive but not enough to affect the value of investment and the percentage of investment credit interest has a negative effect but is not significant enough to affect the value of investment in South Sumatra Province because it is not significant at level one and five percent so it does not need to be defined each magnitude of influence. This is in line with the research of Nurcholis (2006). In this FEM model, the adjusted R squared value is 97.78 percent. This can be interpreted that the model obtained is able to be explained by several explanatory variables of 97.78 percent and the rest by other variables outside the model.

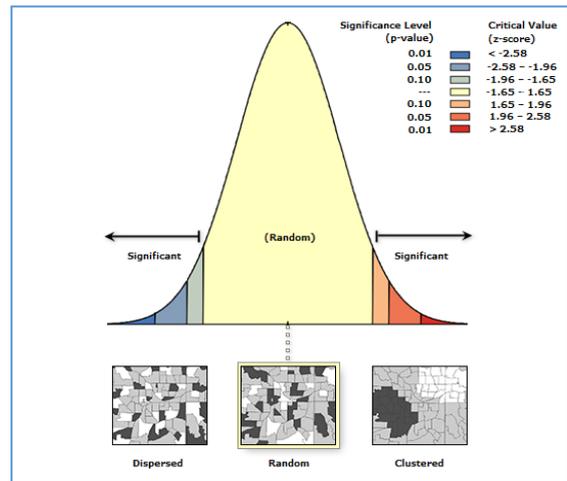TABLE 2. OUTPUT RESULTS OF PANEL DATA
REGRESSION

Variabel	Koefisien	Prob.
Intersept	-26.86042	0.0000
HDI	3.699774	0.0000
GRDP per capita	0.933351	0.0000
Labour	0.883930	0.0000
Relative path lenght	0.005528	0.4879
Investment credit		
Interest rate	-0.010311	0.9093

B. Analysis of Spatial Influence

The results of the analysis of spatial autocorrelation with the Moran's I test conducted provide a Moran Index value of -0.252. This shows that globally there is a negative spatial autocorrelation which means that there is a spatial influence of investment between districts / cities in South Sumatra Province. If seen locally through the LISA test, there are districts that have spatial influences, namely Banyuasin District. The Moran Index and LISA test results show the influence or spatial effect of investment variables between regions, then the Geographically Weigted Regression (GWR) modeling can be done. The influence of location is considered different in influencing the investment component in the South Sumatera Province region seen from the LISA (Local Indicator Spatial Autocorrelation) test.

A special case in spatial dependencies is the Spatial Autocorrelation Local Indicator (LISA), which can show observations locally on observed variables, meaning observations in a location depend on observations in other locations that are close together. From the LISA test, the significance of the relationship will be obtained locally in each district. Districts that have spatial autocorrelation of investment with a significant level of 0.01, namely Banyuasin district. The LISA test is also done for the independent variables, the results of the GRDP per capita variable are two significant regions that have

spatial autocorrelation, namely Banyuasin and Muara Enim District.

Moran's Index: -0.252075, z-score: -1,204148

Figure 2. Output Results of Spatial Autocorrelation Test with Moran Index

The results of the GWR modeling in several regions in South Sumatra Province show the coefficient values of each of the variables which differ in magnitude and significance level, as presented in Table 3.

Table 3. GWR Model Output (Geographically Weighted Regression)

Districts	HDI Coefisien	GRDP per Capita Coefisien	Labour Coefisien	Interest rate Coefisien
OKU	4.224***	0.984***	0.832***	-2.638
OKI	4.333*	0.987*	0.884	-2.748
Muara Enim	4.206***	0.962***	0.861***	-2.632
Lahat	2.967	0.984***	0.937**	-2.280
Musi Rawas	3.948***	0.959***	0.886***	-2.557
Musi Banyuasin	4.088***	0.967***	0.914***	-2.659
Banyuasin	4.747***	0.957***	0.943***	-2.937
OKU Selatan	4.208*	0.986***	0.811***	-2.611
OKU Timur	4.206**	0.989***	0.827***	-2.633
Ogan Ilir	4.370***	0.982***	0.896***	-2.769
Empat Lawang	4.043	0.964**	0.867	-2.580
Palembang	4.401***	0.980***	0.912***	-2.799
Prabumulih	2.965***	0.984***	0.938***	-2.281
Pagar Alam	4.121***	0.968***	0.842***	-2.584
Lubuk Linggau	2.969*	0.983***	0.937	-2.280

***sign 0.01, ** sign 0.05, * sign 0.1

Mapping the GWR model coefficient elasticity results are as follows:

1. HDI elasticity for investment

The effect of HDI elastistas on investment can be assessed high and real in the southern and eastern parts of South Sumatera (Figure 3).
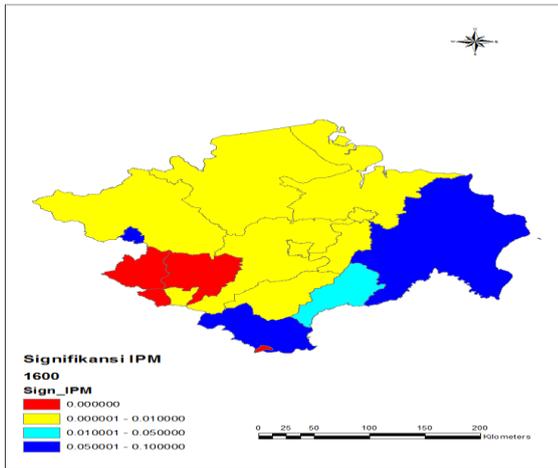

Figure 3. HDI elasticity for investment

2. Elasticity of GDP per capita for investment

The effect of the per capita GDP per capita is quite high on investment in South Ogan Komering Ulu, Ogan Komering Ulu Timur, and Ogan Komering Ilir (Figure 4).
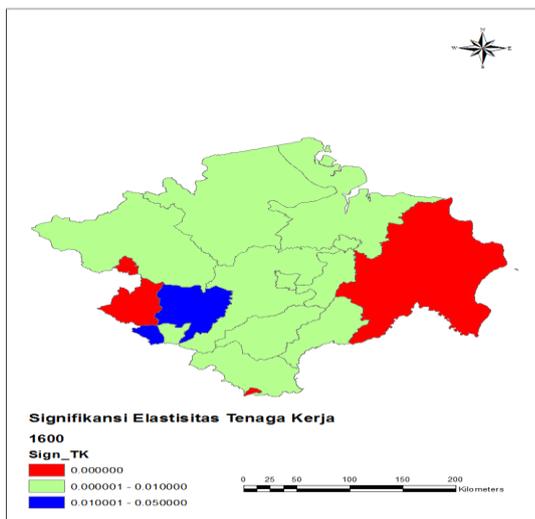

Figure 4. Elasticity of GDP per capita for investment

3. Labor elasticity for investment

The labor elasticity of investment in the South Sumatra Province has a significant influence, namely in Lahat District, Prabumulih Regency, and Banyuasin Regency (Figure 5)
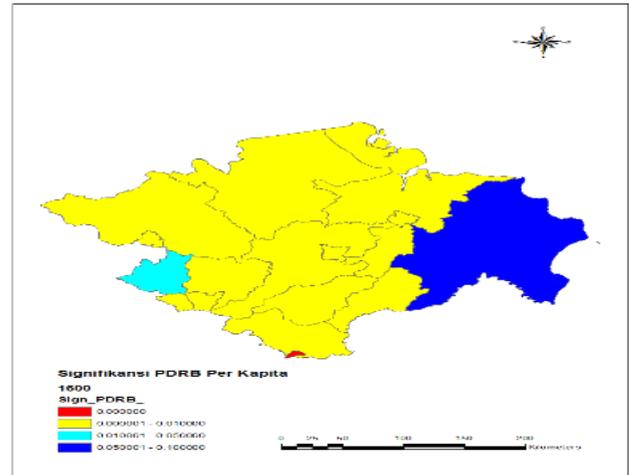

Figure 5. Labor elasticity for investment

IV. CONCLUSION

The results of the research that have been done can be obtained as follows:

Factors that significantly affect regional investment in South Sumatera Province, namely HDI have a positive effect, GRDP per capita has a positive effect and the variable number of workers also has a positive effect. The variable length of the road relative to the area and interest rates on investment loans has no significant effect on investment in the South Sumatera Province.

The LISA test results indicate that there is a spatial influence in the district / city area in the Province of South Sumatera having an investment. The results of the GWR modeling in several regions in the Province of South Sumatra show the coefficient values of each variable with different magnitude and significance level. The effect of HDI elastistas on investment is highly valued in the southern and eastern parts of South Sumatera. The effect of the per capita GRDP per capita is quite high on investment in the South Ogan Komering Ulu District, East Ogan Komering

Ulu, and Ogan Komering Ilir. The labor elasticity of investment has a quite high influence, namely Lahat, Prabumulih, and Banyuasin District.

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