Spatial Dimensions of Inequality in Human Development Index on West and Central Regions of Indonesia

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Abstract. This research aims to analyze the inequality of HDI on Java Island and Sulawesi, see the spatial autocorrelation of HDI, and to analyze effect of population size, percentage of poor people, and high school net enrollment rate on HDI in districts/ cities in Java and Sulawesi. HDI inequality is seen using the Coefficient of Variation value. The analysis is using spatial and non-spatial concepts. The results show that inequality in human development in Java and Sulawesi has decreased throughout the period. In both research areas, there is a spatial autocorrelation of HDI, with the best spatial model is Spatial Error Model. However, by using non-spatial analysis, the best model obtained is the Fixed Effect Model. In Java Island, the variable rate of the percentage of poor people and the high school net enrollment rate has significant effect on HDI. While in Sulawesi, the variable population size and high school net enrollment rate has significant effect on HDI.

Keywords: human development; inequality; spatial autocorrelation

1 Introduction

The problem of inequality in development, especially inequality in human development, is still an important issue. Inequality in human development is still found between individuals, between genders between dimensions, and between regions. The western regions of Indonesia, which consist of the islands of Java and Sumatra, are known to be in better condition than those in the central regions of Indonesia, such as the islands of Kalimantan and Sulawesi islands. The island of Java was chosen as the research location representing the Western Region of Indonesia, because it is known that on the island of Java, the HDI level was above the national average from 2016-2019, which was 71.07 percent, while Sulawesi Island was chosen as a comparison location, because the HDI level of the island Sulawesi is below the national average. In addition, based on economic characteristics between different regions, namely Sulawesi Island is characterized by agriculture, while Java Island is characterized by industry and services. Differences encourage regional economic interaction to meet intermediate inputs and final demand. Tobler's law says that adjacent locations have a higher relationship than distant locations or regions. Based on Tobler's law, it can be interpreted that the HDI of districts / cities in Java and Sulawesi which have close locations have a higher correlation.

Based on the population theory and endogenous growth theory, this study discusses what factors can affect the Human Development Index. The population theory proposed by Malthus explains that population growth is the result of the development process. Without a proportional increase in welfare, population growth will have a negative impact. When the population

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increases, people's needs will increase, and public consumption will increase. High population growth will slow down development but can also accelerate development. With a quality population, development will be faster (Malthus, 2013).

As research conducted by (Niranjan, 2020) HDI positively and very significant which reflects a strong spatial influence, the HDI value of a region is strongly influenced by the observations of its neighbors. Improved access and health services, education, poverty alleviation and other deprivations in micro-spatial level will reduce spatial inequality and improve quality of human development. Meanwhile, according to (Trianggara et al., 2016) by using the Spatial Autoregressive model with a spatial fixed effect, School Participation Rate and percentage of poverty in each district/city affect the Human Development Index. The difference between the West region with the Eastern region not too much. The government factor variable is not affect HDI levels, but poverty and school enrollment rates affect the HDI level, as well as on infrastructure that affects HDI level significantly (Nurwita, 2010).

Therefore, this study was conducted to discuss the spatial dimensions of human development and find out the spatial interrelationships in Indonesia, especially the Western Region of Indonesia and the Central Region of Indonesia, which are represented by Java and Sulawesi, respectively, by comparing the Human Development Index at the provincial level and see what factors determine spatial inequality in human development. Besides that, this research intends to examine how the influence of the population, the percentage rate of the poor, and the pure participation rate at the high school level on the Human Development Index.

2 Method

This study uses panel data, which is a combination of time series and cross section. Where the cross section data are districts/cities in Java and Sulawesi, while the time series data used are data from 2016 to 2019. The population, the percentage rate of the poor, the pure participation rate at the high school level between districts/cities in Java and Sulawesi Island as the independent variable. While the Human Development Index figures as the dependent variable. The data used is sourced from the publication of the Central Bureau of Statistics.

According to Lasdiyanti (2019, this study uses the following model specification to estimate spatial effect and non-spatial effect

$$IPM_{it} = \beta_0 + \beta_1 PDDK_{it} - \beta_2 MISKIN_{it} + \beta_3 APM_{it} + \epsilon t$$

Spatial analysis this study use spatial linkage analysis that was used to determine the neighboring elements of 119 regencies/cities in Java and 81 regencies/cities on Sulawesi Island and the effect of neighbors on the HDI of a district. In determining the spatial relationship will be carried out several stages. Tools of analysis using Moran Index and Moran scatterplot.

3 Result and Discussion

The results of this study indicate that the quality of the population in terms of education will affect the welfare of their lives so that they can improve the quality of human development and economic development. The challenge of human development in Indonesia that still

requires serious attention is the gap in human development achievements between regions. It can be seen from Table 1 that the coefficient of variation of the HDI in all regions of Java and Sulawesi has decreased during the 2016-2019 period. The highest CV decline was seen in 2016-2017 from 7,921 to 7,740 for Java Island and 6.67 to 6.52 for Sulawesi Island.

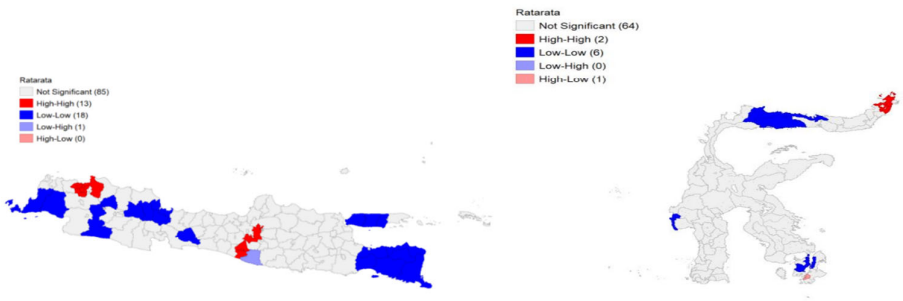

Figure 1. LISA Cluster Map Results on Java and Sulawesi Island Average HDI 2016-2019

Figure 1 shows the results of the LISA cluster map in Java and Sulawesi Island. In Java Island results shows there are regencies/cities on the island of Java that have spatial relationships. 13 districts/cities have a high average HDI and are surrounded by districts/cities with high HDI. The most areas with high category are in DKI Jakarta Province. This happens because the 6 regions in the Province DKI Jakarta has a very high level of HDI achievement which is mutually exclusive affect neighboring areas. Then 18 districts / cities have a low HDI and are surrounded by districts/cities with a low HDI (low-low). The most regions with the category (low-low) are in Java Province East and West Java. There is only 1 district/city that has a low HDI and surrounded by regencies/cities with high HDI, namely Bantul Regency. Based on the results of spatial linkages, with 18 Regencies/Cities included in the High-High category means in accordance with the theory. When a region has high development in the fields of economy, education, and health. The region can also provide services to other existing regions surrounding. Furthermore, the adjacent area will also experience increase in HDI.

There are 2 districts/cities that have a high average HDI and surrounded by regencies/cities with high HDI in Sulawesi Island, namely Minahasa and North Minahasa districts. This happens because 2 districts It has a high level of HDI achievement. Then only 6 districts/cities have low HDIs and are surrounded by districts/cities with low-low HDIs. Most areas with (low-low) category are located in Gorontalo Province. There is only 1 Regency/City that has a high HDI but surrounded by regencies/cities with low HDI, namely Kota Bau-Bau. Based on the results on Sulawesi Island, with 2 districts/cities categorized as High-High and the value of Z in 2016 of 2.4253 means that it has a relationship spatial but low.

Table 1. Best Model Selection

Coefficient	Java Island		Sulawesi	
	FEM	SEM	FEM	SEM
Intercept	59.8475	59.5432	50.9544	63.4855

PDDK	0.0038	0.00028	0.05712	0.00581
MISKIN	-0.1133	4.39327	0.00249	-0.4348
APM	0.1018	0.20558	0.05692	0.12881
R^2	0.9923	0.7333	0.9905	0.6061
AIC	1.8946	605.149	1.6855	409.841
Log Likelihood	-328.91	-298.575	-189.0476	-200.920

Based on the table, the AIC and Log Likelihood results were tested to obtain the best model. The best model is obtained if the AIC value is the smallest, the Log Likelihood value is the largest, and R^2 is the largest. Based on the results of these calculations, for Java and Sulawesi Island, the Fixed Effect Model will be used as the best model.

Java Island Fixed Effect Equation Model:

$$IPM_{it} = 59{,}8475 + 0{,}0038PDDK_i - 0{,}1133MISKIN_i + 0{,}1018APM_i + \varepsilon_i$$

Sulawesi Island Fixed Effect Equation Model:

$$IPM_{it} = 50{,}9544 + 0{,}0571PDDK_i + 0{,}00249MISKIN_i + 0{,}05692APM_i + \varepsilon_i$$

The results show in Java island that the variables of the Percentage of Poor Population and the Pure Enrollment Rate at the high school level have a significant relationship to the Human Development Index at = 0.05. However, the Population Number variable has an insignificant relationship to the Human Development Index because the p-value is > (0.05). This happens because with the spatial concept, the population in the Java Island area is not related to other areas. The results of Sulawesi island estimation show reveal that the variables of Population and Pure Participation Rate at the high school level have a significant relationship to the Human Development Index at = 0.05. However, the percentage rate of the poor population does not have a significant relationship with the Human Development Index. This conclusion is obtained by looking at the p-value < = 0.05. This happens because in the spatial concept there is a phenomenon, namely the phenomenon of poverty. Poverty in several districts on the island of Sulawesi is getting worse. Based on the data, the poverty rate in several regions is increasing every year.

Java Island is the island with the most populous population in Indonesia in general, showing a performance that does not look significant. This shows that population growth due to fertility and urbanization is not followed by population productivity. Based on data from the 2015 Inter-Census Population Survey, migration from Sulawesi Island to Java Island reached 207 thousand people. Migration of population between regions at the sub-district, district, and province and state levels is caused by various reasons, this is due to the difference in labor wages between the origin and destination areas and the desire to obtain a better education at the next level. People who migrate see the hope of getting the opportunity to improve their standard of living.

Sulawesi Island is one of the largest islands in Indonesia, with an average HDI value that is below the national average. There are various phenomena regarding inequality or poverty on the island of Sulawesi. Based on the data, the average HDI value in Sulawesi Island has just entered the medium category with a figure of 68.90 percent, which means it is below the national

average. The highest HDI on Sulawesi Island is in North Sulawesi Province with an average of 71.97 percent, where the only province on Sulawesi Island is above the national average. Meanwhile, the lowest HDI figure is in West Sulawesi Province with an average of 64.68 percent.

4 Conclusion

The findings of this study lead to conclusion the disparity or inequality of human development in the districts/cities on the islands of Java and Sulawesi has decreased throughout this period. There is a spatial relationship between the HDI in Java and Sulawesi, meaning that the HDI achievement in one area will affect the HDI achievement in other areas. The estimation results also show that the variable percentage rate of the poor and the pure participation rate at the high school level have a spatial effect on the HDI in the research on Java Island, while in the research on the island of Sulawesi, the population variable and the pure participation rate at the high school level have a spatial effect on the HDI.

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