Spatial Modeling in The Coastal Area of East Java Province

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Abstract. The existence of gaps that occur between regions, shows that it is a reasonable process considering that each region has different initial endowment factors. The first step that can be done to control disparity is to know what is the benchmark of the gap. The revenue growth indicator is one of the benchmarks for measuring regional disparities. The regional output is represented by the gross domestic regional income per capita. Concerning the phenomenon of regional disparity, East Java Province is concentrated in the north-south part, especially in coastal areas, which is an early indication of the gap. This is what prompted the analysis of predictor factors affecting the disparity in East Java Coastal Areas through a spatial modeling approach.

Spatial modeling is done on the consideration that there are different local characteristics or potentials in each regency / city. Factors economic growth, social factors, and physical development factors are the main factors in this study will be described in derived variables to obtain a clear picture of the influence of each factor to the disparity that occurred in the Coastal Region of East Java Province.

1. Introduction

Regional disparities occur due to differences in potential resources in an area. These resources include geographical conditions, diversity of natural resources, quality of human resources, and ethnic or political ties [1]. Reducing regional disparities is one of the central themes in regional development [2]. The gap in here is the inequality of inter-regional development progress that occurs due to differences in the rate of growth. Responding to the gap that occurs between regions, it can be said that it is a reasonable process considering that each region has a factor of initial endowment which is different from each other [3].

On a regional scale, disparities can also lead to conflict between regions. In addition to the threat of disintegration and conflict between regions, the gap between regions also ultimately leads to an increase in the number of poor people [4]. Responding to these negative impacts, it is clear that regional disparity is a crucial issue in the context of regional development and it is well worth the attention. To be able to overcome the problem of regional gaps, then first must be known benchmark of the gap. In the context of regional development, the gap size is determined based on indicators of regional development success. Benchmarks for measuring disparities are measured from income inequality and GDP growth [5]. Meanwhile, the income growth indicator for measuring regional disparities is the concept of regional output using the approach area. Regional output is represented by an indicator of per capita gross regional domestic income [6].

Based on the above description, this research will analyze the level of disparity in East Java with spatial modeling approach. Consideration of spatial approach due to the different characteristics of local potential that exist in each region. The scope of this study takes Coastal Area in East Java Province. Coastal Area in East Java Province is the main area of zoning of coastal area and small islands covering regencies / cities which have sea area that is bordered by sea such as Tuban Regency, Lamongan Regency, Gresik Regency, Surabaya City, Sidoarjo Regency, Pasuruan Regency, Pasuruan
City, Probolinggo City, Probolinggo Regency, Situbondo Regency, Banyuwangi Regency, Bangkalan Regency, Sampang Regency, Pamekasan Regency, Sumenep Regency, Lumajang Regency, Malang Regency, Blitar Regency, Tulungagung Regency, Trenggalek Regency, Pacitan Regency and Jember Regency [7]. Social, physical, and economic equity issues in East Java Coastal Region become one of the main issues that become the program of East Java Province to reduce regional disparity [8].

2. General Description About Disparities Issues in The Coastal Area of East Java Province

Equity and efforts to open access in the underserved islands of coastal and small island areas in the East Java Province is a major issue in the East Java Coastal Area [8]. The issue is divided into social, economic, and physical issues.

a. Social issues are reducing the number of poverty, fulfilling the basic rights of coastal communities in obtaining proper education and health services.

b. Economic issues are optimizing the potential utilization of the marine economy, optimizing sources of funding and development, unstable economic growth on the north and south coasts, and increasing commercial activity in ports.

c. Physical issues concern about infrastructure aspect such as the improvement of accessibility, the fulfillment of disaster infrastructure because the coastal area is a region that has various potential of natural disasters such as earthquakes, landslides (especially in coastal areas that have a type of cliffs like in The Southern Coast of East Java) tidal waves, tsunami and floods.

3. Disparity Analysis in The Coastal Area of East Java Province

Disparity analysis is divided into economic, social and physical disparities. Adapun to get the value of economic disparities obtained from the average value per capita GDP ratio during 2010-2014. Social disparity is derived from the average Human Development Index during 2010-2014. Physical disparities were obtained from the total road density ratio, the ratio of clean water use, the ratio of energy sold per capita from 2010-2014. The value of economic, social, and physical disparities is illustrated in Figure 1 to Figure 3.

Based on the Economic Disparity Chart, the average disparity value in The Coastal area of East Java Province is in the range of 0.0050 - 0.0989 during 2010-2014. The regencies / cities in the range are Trenggalek, Tulungagung, Blitar, Malang, Lumajang, Jember, Banyuwangi, Situbondo,
Probolinggo, Pasuruan, Sidoarjo, Tuban, Lamongan, Kabupaten Gresik, Bangkalan, Sampang, Pamekasan, Sumenep, Probolinggo City, Pasuruan City and Surabaya City.

Fig 2. Average Value of Social Disparity in The Coastal Area of East Java

Based on the Social Disparity Chart, the average disparity value in The Coastal area of East Java Province is in the range 0.0003-0.0080 during 2010-2014. The regencies / cities in the range are Pacitan, Trenggalek, Tulungagung, Blitar, Kediri, Malang, Lumajang, Jember, Banyuwangi, Situbondo, Probolinggo, Pasuruan, Sidoarjo, Tuban, Lamongan, Gresik, Bangkalan, Sampang, Pamekasan, Sumenep, Probolinggo City, Pasuruan City and Surabaya City.

Fig 3. Average Value of Physical Disparity in The Coastal Area of East Java

Based on the Physical Disparity Chart, the average disparity value in The Coastal area of East Java Province is in the range 0.2737 - 0.3188 during 2010-2014. The regencies / cities in the range are...
Jember, Bnayuwangi, Probolinggo, Pasuruan, Lamongan, Bangkalan, Sumenep, Pacitan, Ponorogo, Kediri, Sidoarjo, and Probolinggo City.

4. Spatial Modeling in The Coastal Area of East Java Province

Spatial modeling analysis to find out what factors affect the regional disparity in The Coastal Area of East Java Province through spatial regression by incorporating geographical elements in searching for influence models. However, before stepping on to the analyst required regression analysis Ordinary Least Square (OLS) which aims to determine whether this analysis requires geographical elements in it. The first step in the OLS regression analysis is to determine the variable of Regional Disparity Value as the dependent variable (Y) per regency / city in East Java Province and the GDP per capita variable, School Average School Values (RRLS), Literacy Rate (AMH), Life Expectancy (AHH), Poverty Percentage (K), Road Density Ratio (RJ), Per Capita Water (Water) Consumption and Electricity Per Capita (E) as independent (X). Before proceeding to the GWR analysis, a Classic Assumption Model Test must first be performed to determine the validity of the resulting model [9]. After the classical assumption test done, the next step do partial test with t-test.

The result from the test variable shows that variables affecting to disparities in coastal areas of East Java are life expectancy (AHH), electricity per capita (E), and percentage of poverty (K). The spatial modeling in each region shown in the Table 1.

Table 1. Spatial Modeling of Disparities in The Coastal Area of East Java Province

| No | Regency/City     | Spatial Modeling                  |
|----|------------------|-----------------------------------|
| 1  | Pacitan          | Y = 5,872 - 0,116 AHH +0,000001 E |
| 2  | Ponorogo         | Y = 5,831 - 0,116AHH +0,000001 E  |
| 3  | Trenggalek      | Y = 5,959 -0,118AHH +0,000001 E   |
| 4  | Tulungagung      | Y = 5,931 -0,117AHH +0,000001 E   |
| 5  | Blitar           | Y = 6,009 -0,119AHH +0,000001 E   |
| 6  | Kediri           | Y = 5,946 -0,118AHH +0,000001 E   |
| 7  | Malang           | Y = 6,011 -0,119AHH +0,000001 E   |
| 8  | Lumajang         | Y = 5,986 -0,119AHH +0,000001 E   |
| 9  | Jember           | Y = 5,975 -0,119AHH +0,000001 E   |
| 10 | Banyuwangi       | Y = 5,976 -0,118AHH +0,000001 E   |
| 11 | Bondowoso        | Y = 5,842 -0,117AHH +0,000001 E   |
| 12 | Situbondo        | Y = 5,778 -0,116AHH +0,000001 E   |
| 13 | Probolinggo      | Y = 5,805 -0,116AHH +0,000001 E   |
| 14 | Pasuruan         | Y = 5,9105 -0,117AHH +0,000001 E  |
| 15 | Sidoarjo         | Y = 5,855 -0,116AHH +0,000001 E   |
| 16 | Mojokerto        | Y = 5,891 -0,117AHH +0,000001 E   |
| 17 | Jombang          | Y = 5,897 -0,117AHH +0,000001 E   |
| 18 | Nganjuk          | Y = 5,902 -0,117AHH +0,000001 E   |
| 19 | Madiun           | Y = 5,885 -0,116AHH +0,000001 E   |
| 20 | Magetan          | Y = 5,853 -0,116AHH +0,000001 E   |
5. Conclusion
Predictor factors affecting Disparity in The Coastal Area of East Java Province based on the analysis with spatial modeling indicate that the majority of regency/cities are influenced by Life Expectancy Numbers (AHH) and Per Capita Electricity Consumption (E). Meanwhile, only Sumenep Regency has different characteristic, that is influenced by Variable Life Expectancy (AHH), Per Capita Electricity Consumption (E), and Poverty Percentage (P). This is because, Sumenep Regency tend to fluctuate percentage of poverty and the average percentage of poverty during the last five years is greater than the average East Java Province.

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