Spatial Patterns Of Economic Growth In East Java Province

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***Abstract*— This research is aimed at examining the spatial distribution pattern of economic growth within East Java Province. It delves into the interrelationships among regions in each district and city of the province. Employing a descriptive approach with a case study model, this study unveils the significance of regional linkages based on economic growth, manifested through spatial correlation patterns. The analytical methodology encompasses Moran's index analysis to gauge the strength of relationships between regions and their neighboring areas. Additionally, the Local Indicator of Spatial Association (LISA) is employed to determine whether individual observations exhibit noteworthy spatial clustering. The cumulative LISA values for each locale are proportionate in size to the global size. The research findings indicate a presence of spatial autocorrelation in the economic growth of East Java in 2022, with a Zcount value exceeding 1.1284. This autocorrelation underscores the existence of a meaningful link or relationship in economic growth between districts and cities in East Java. Consistent with prior assessments, there are detectable clusters in specific locations. The Moran I value for 2022 stands at 0.0725, surpassing Io = -0.027. Moreover, the LISA results, with a significance level of 0.05, encompass three regions: Pacitan Regency, Sur**abaya City, and Sumenep Regency

Keywords*— *Economic Growth, Spatial, Moran Index, LISA

I. INTRODUCTION

The spatial relationship of economic growth essentially describes the economic relationship between a region and its environment. This connection may occur because it is influenced by several aspects, especially the boundaries of a region which create obstacles in meeting the needs of the region itself, the existence of similarities in the economic conditions of several regions will facilitate economic cooperation and the growth of awareness to create coordination between regions in building regional economic strength [1].

According to Perroux [2], space is a force that gives rise to spatial interactions, space is a systematically organized network with centripetal force, which is the basis of central growth theory. [3] explains why development is so polarized and can be beneficial for economic growth. Hirschman said growth is occurring in areas that create "trickle-down" benefits. Finally, Hirschman has a strong belief that the trickle-down effect will be greater than the polarization effect due to increasing pressure to adopt economic policies.

Regional science, new economic geography, and urban science all revolve around the regional spatial structure, This is a region's spatial distribution and integration of many economic factors.

Regional spatial structure and regional development are related, and regional economic development is significantly impacted by the reasonableness or unreasonability of regional spatial structure, according to [4]. As different regional spatial structures characterize different stages of development, it is also an important predictor of regional development advancement [5], [6]. Therefore, regional spatial planning must be the government's concern so that economic growth can be achieved.

They found that the average expenditure data in Papua are affected by geography [7]. The SAR model is superior to the OLS model, according to comparative results between the two models. [8] explains that economic characteristics and sectoral characteristics (eg sectoral production structure, education, etc.) have a significant effect on spatial dependence between regions.

This research aims to look at the spatial distribution pattern of economic growth in East Java Province by looking at the interrelationships between regions in each district and city in East Java Province.

II. METHODS

This type of research is descriptive with a case study model because it reveals the meaning of the phenomenon of regional linkages based on economic growth which is shown in the spatial correlation pattern. In this research, economic growth is measured using GRDP based on 2010 constant prices. The main source of research is GRDP data based on 2010 Constant Prices which was collected through data from the Central Statistics Agency for 2022. The analysis method used is the Moran index analysis. Moran index analysis shows how strong a region's relationship is with the surrounding regions. The Moran index value (Moran's I) shows a tendency for concentration or clustering [9]. Conversely, if the value is close to a negative value (-) 1, it shows a tendency to be random or an outlier (gap). Clustered, random, or scattered patterns are types of spatial interrelationship patterns resulting from the Moran index. The following is the technique for calculating the Moran index:

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$$I = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - x)(x_j - x)^2}{\sum_{i\neq j}^{n} w_{ij}\sum_{i=1}^{n}(x_i - x)^2}$$

With:
I: Moran Index
n : number of incident locations
xi : value at location i
xj : value at location
j : the average of all objects
wij: element in standardized weighting between areas i and j

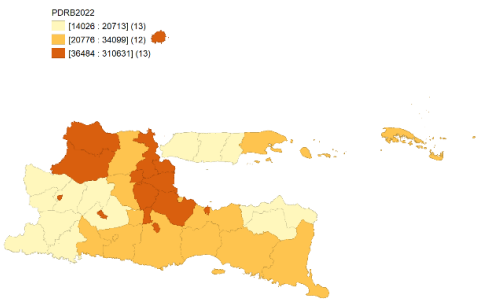
Apart from the Moran Index, the analytical method used is the Local Indicator of Spatial Association (LISA), which is a statistic used to determine specific regional relationships. [10] suggests that LISA must meet two requirements: the LISA for each observation shows the existence of significant spatial clustering around the observation and the summed LISA for each local measure is proportional to the global measure. The LISA calculation technique is as follows:

$$I = (\mathrm{y_i} - \overline{y})\sum_{i}^{n} w_{ij}(y_i - \overline{y})$$

The spatial binary weighting matrix with observation location, observation location, overall average value of observations, and the total number of geographic units or locations is the value w_ij= 0 if two locations are not neighbors or share regional boundaries w_ij =1. In this case, the null hypothesis is tested, indicating that there is no relationship between the value observed at location i and the value observed nearby; in other words, the I's values are zero. Positive (negative) values for z-scores and I's values that indicate grouping of the same or different values around a location indicate positive (negative) local spatial autocorrelation [10].

III. Result and Discussion

Development of Economic Growth in 2022
Economic growth is spread across several districts and cities in East Java province



Source: Geoda Analysis

High economic growth: there are 13 regencies and cities, namely: Gresik Regency, Surabaya city, Mojokerto regency, Sidoarjo regency, Batu city, Pasuruan regency, Probolinggo city, Kediri city, Madiun city, Bojonegoro regency, Tuban regency, Probolinggo city, Malang city

Moderate economic growth: there are 12 regencies and cities, namely: Lamongan regency, Jombang regency, Sumenep regency, Malang regency, Blitar regency, Tulungagung regency, Probolinggo regency, Lumajang regency, Jember regency, Banyuwangi regency, Pasuruan city, and Blitar city.

Low Economic Growth: there are 13 regencies and cities, namely: Regencies of Bangkalan, Sampang, Pamekasan, Situbondo, Bondowoso, Kediri, Nganjuk, Trenggalek, Madiun, Ponorogo, Pacitan, Magetan, and Ngawi.

Based on the results of spatial autocorrelation testing with Moran's I (Table 2) with a significance level of 5 percent, it is known that there is spatial autocorrelation in economic growth in East Java in 2022. This is indicated by the Zcount value >1.1284. This spatial autocorrelation shows that there is a link or relationship between economic growth between districts/cities in East Java. As in the previous identification, there are groupings at several locations. The Moran's I number in 2022 is 0.0725 which is greater than Io = -0.027. This shows that there is positive autocorrelation or a pattern that is clustered and has similar characteristics in adjacent locations.

TABLE I. Moran's I Test

Moran Indeks	*P value*	*Z value*	*E (i)*	*SD*
0,0725	0,112000	1.1284	-0.0276	0.0886

Source: Geoda Analysis

Figure 1 is a Moran's scatterplot which shows the pattern of relationship between economic growth in one district/city and other districts/cities. The districts/cities in each quadrant in 2022 include:

Quadrant 1: Gresik Regency, Batu City and Surabaya City. This district/city has a high economic growth value and is close to other districts that also have a high economic growth value.
Quadrant 2: Kediri Regency, Mojokerto City, Pasuruan City, and Lamongan Regency. This district/city has a low economic growth value and will be close to other districts/cities that have a high economic growth value.
Quadrant 3: Tulunggagung Regency, Malang Regency, Bondowoso Regency, Blitar Regency, Banyuwangi Regency, Situbondo Regency, Magetan Regency, Bondowoso Regency, Nganjuk Regency, Ngawi Regency, Pacitan Regency, Bangkalan Regency, Jember Regency, Ponorogo Regency, Sumenep Regency, Tuban Regency, Jombang Regency, Probolinggo City, Pamekasan Regency, Lumajang Regency, Sampang Regency, Trenggalek Regency, Probolinggo Regency, Madiun Regency. This city or district has a low rate of economic growth, and it is near other areas with similar rates.
Quadrant 4: Kediri City, Madiun City, Malang City, and Pasuruan Regency. This district/city has a high economic growth value and will be close to other districts that have a percentage value of economic growth.

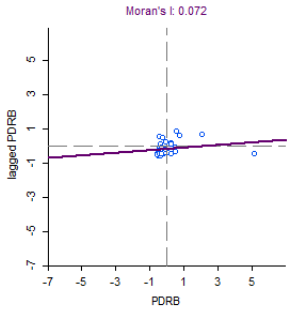


Fig. 1. Geoda Analysis

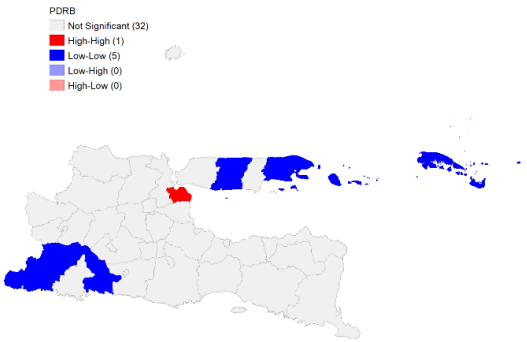


Fig. 2. Geoda Analysis

The LISA cluster map depicts GRDP groups with regional indications as follows:

TABLE II. LISA CLUSTER MAP RESULT

Cluster Region	Regency/City
High-High	Surabaya
Low-low	Sampang Regency, Sumenep Regency, Tulungagung Regency, Ponorogo Regency and Pacitan Regency.
Low-High	-
High-Low	-
Not Significant	Regency : Bangkalan, Banyuwangi, Blitar, Bojonegoro, Bondowoso, Gresik, Jember, Jombang, Kediri, Madiun, Magetan, Malang, Mojokerto, Nganjuk, Ngawi, Pamekasan, Pasuruan, Probolinggo, Sidoarjo, Situbondo, Trenggalek, Tuban. City: Batu, Blitar, Kediri, Madiun, Malang, Mojokerto, Pasuruan, and Probolinggo.

Source: Geoda Analysis

The following is an analysis of the LISA significance distribution map in the image:

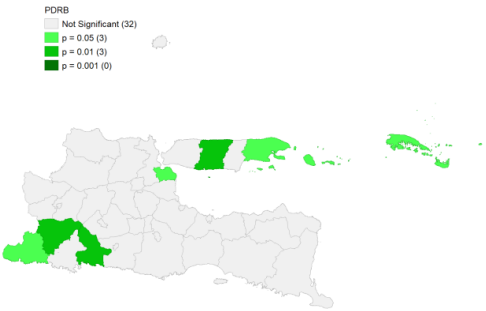


Fig. 3. Geoda Analysis

The LISA significance map as follows:

TABLE III. LISA SIGNIFICANCE MAP

LISA significance map Result	Regency/City
significance of 0.05	Pacitan Regency, Surabaya City and Sumenep Regency.
significance of 0.01	Regency: Ponorogo, Tulungagung, and Sampang.
Not Significant	Regency : Bangkalan,Banyuwangi, Blitar, Bojonegoro, Bondowoso, Gresik, Jember, Jombang, Kediri, Lamongan, Lumajang, Madiun, Magetan, Malang, Mojokerto, Nganjuk, Ngawi, Pamekasan, Pasuruan, Probolinggo, Sidoarjo, Situbondo, Trenggalek, and Tuban. City: Batu, Blitar, Kediri, Madiun, Malang, Mojokerto, Pasuruan, and Probolinggo.

Source: Geoda Analysis

The difference in the size of GDP for each district/city causes grouping or distribution, proximity relationships play a role in how a region influences its neighbors.

IV. CONCLUSSION

Based on the results of spatial autocorrelation testing with Moran's I (Table 2) with a significance level of 5 percent, it is known that there is spatial autocorrelation in economic growth in East Java in 2022. This is indicated by the Zcount value >1.1284. This spatial autocorrelation shows that there is a link or relationship between economic growth between districts/cities in East Java. As in the previous identification, there are groupings at several locations. The Moran's I number in 2022 is 0.0725 which is greater than Io = -0.027. This shows that there is positive autocorrelation or a pattern that is clustered and has similar characteristics in adjacent locations. Meanwhile, the results of the LISA analysis describe the GRDP group with an indication of "High" areas covering 1 region, Low-Low covering 5 regions, Low-High: 0, High -Low: 0, Not Significant 32 regions.

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