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Spatial Analysis of The Number of Poor Population in East Java Province In 2023

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ABSTRACT

Poverty has many important influences in a country because of the broad and complex impact it has on individuals, society, and the economy as a whole. The use of spatial analysis techniques in the context of poverty is important to understand the spatial distribution and factors related to economic inequality in the region. The aim of this research is to descriptively analyze the regional interrelationships of the Open Unemployment Rate (TPT), Human Development Index (HDI) and Number of Poor People variables, as well as analyzing inferentially to determine variables that significantly influence the Number of Poor People. The spatial analysis method used in This research involves descriptive and analysis methods Ordinary Least Squares (OLS). From this research it is concluded that the variables TPT, HDI and Number of Poor Population are related between regions because they have a Moran's I Index > 0. In the OLS Analysis it can be concluded that the variable Number of Poor Population can be influenced statistically significantly by the variables Open Unemployment Rate and Human Development Index Abstract is a summary of an article written in one paragraph. Maximum 200 words. The abstract must contain background and objectives, methods, results and conclusions.

INTRODUCTION

Open Unemployment Rate Open unemployment according to the Central Statistics Agency (BPS) is people entering the workforce (15 years and over) who are looking for work, who are preparing for business, who are not looking for work because they feel it is impossible to get a job, and at the same time they do not Work. This indicator shows the capacity of the economy to create jobs that effectively absorb the available workforce. The higher the value of this indicator, the greater the amount of untapped labor. This indicator is able to provide clues about labor market performance and special economic circumstances, such as recessions, changes in business and technology cycles, and other aspects. Grouping based on gender, age group and education level can show disparities in labor absorption between these groups. Meanwhile, according to Sukirno (1997). Unemployment is the condition of a person belonging to the labor force and who wants a job but has not yet obtained that job.

Open unemployment, as a tapering economic phenomenon, is a situation that requires in-depth attention and planned solutions from various related parties. When a large number of a country's workforce is forced to be unemployed without decent

work, this is not just a statistic but also a reflection of the imbalance in the economic structure and employment. A high unemployment rate will cause an area to become a burden on the economy.

BPS noted that in 2021, East Java Province will contribute 14.48% of the total Gross Domestic Product (GDP) of Indonesia. East Java is the second largest contributor to GDP in Indonesia after the Special Capital Region of Jakarta at 17.19%. Even East Java consistently contributes more than 14% of GDP every year from 2017-2021, BPS (2022) (Directorate of Production Balance, 2022). The potential that East Java has must continue by ensuring that the Open Unemployment Rate of East Java Province continues to decline and can be controlled. By understanding spatial patterns of unemployment, governments and related institutions can identify specific areas that may face greater challenges.

This analysis helps in determining the focus of interventions to reduce the unemployment rate in the region. There are several studies that explore the number of poor people, such as Shinta Setya Ningrum from the National Land Agency who found that the number of poor people can be explained by independent variables in the statistical model, namely TPT, HDI and minimum wage. Meanwhile, 0.65 percent of the variation in the number of poor people (Y) is explained by factors outside the model. There was also Apriliansyah Mahmud who carried out spatial modeling on the analysis of factors influencing the level of open unemployment in Bangka Belitung Province in 2018 and obtained the results that the variables that were thought to have regional relevance were the open unemployment rate, number of poor people and gross regional regional income. Apart from that, it is also known that the spatial error model is suitable for use in modeling because it has the smallest Akaike Information Criteria value.

The aim of this research is to descriptively analyze the regional relationship between the variables Open Unemployment Rate (TPT), Human Development Index (HDI), and Number of Poor People, as well as analyzing inferentially to determine the variables that significantly influence the Number of Poor People.

RESEARCH METHODS

In 1970 Tobbler said that "everything is related to everything else, but near things are more related than distant things" Which then became "first law of geography" In the world of geography. This law means that adjacent areas will tend to be connected so that they have similar or the same properties. This theory will be tested using the Moran's I index to see whether the variables studied have similar properties according to their regional proximity. The method used in spatial analysis of the number of poor people in East Java Province to find variables that significantly influence the number of poor people isOrdinary Least Squrares (OLS).

$$Y = \beta 0 + \beta 1X1 + \beta 1X1 + \ldots + \beta pXp + \varepsilon$$

Information:
Y = Dependent Variable
βi=Regression Coefficients
Xi= Independent Variables
ε= Random Error Term

To use the OLS model, there are several assumptions that must be met.

1. Normality Assumption
   This involves a situation where the regression errors (residuals) have a normal distribution with a mean of zero and a fixed variance. If just one assumption is not met, then the confidence interval is inaccurate.
2. Non-Autocorrelation
   This assumption is violated if the current observation error is correlated with the previous observation error. This violation can cause bias in the estimator variance values.
3. Homoscedasticity
   This assumption guarantees that the residual variance remains constant. Failure to meet these assumptions can result in estimates that lack precision.
4. Non-Multicollinearity
   This assumption is not met if the independent variables are interrelated or are a function of other independent variables in the model. As a result, the sign of each estimator can be different from the sign in the correlation matrix between variables, and a large standard error can make it difficult to detect the influence of the independent variable on the dependent variable.

For this reason, the following tests need to be carried out

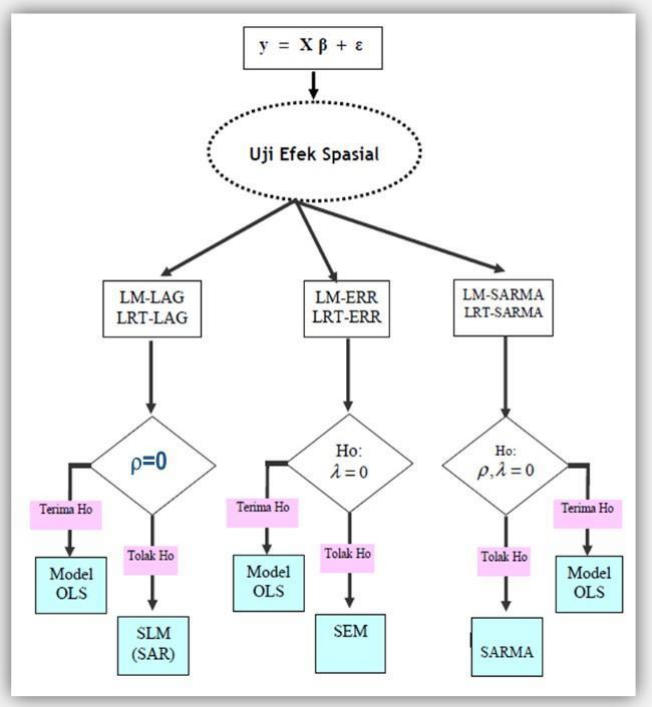

Figure 1. Model Selection Steps

1. Norrmality Test
   The Normality Test is needed to ensure whether the errors formed are normally distributed or not. The Jarque-Bera test is a form of test used to test whether the regression residuals are normally distributed or not. Violation of the normality

assumption will affect the model used, causing statistical inference problems. Therefore, choosing a higher and equivalent confidence interval with a conservative significance level can solve the problem of statistical inference. The null and alternative hypotheses of this test are:

H_0: Residuals are normally distributed.

H_1: Residues are not normally distributed.

2. Heteroscedasticity Test
   The heteroscedasticity test is a statistical test used to test whether the variability (heteroscedasticity) of the regression model error is not constant along the levels of the independent variable. In the context of regression, heteroscedasticity occurs when the error variance is not homogeneous across the entire range of values of the independent variable. That is, error variability tends to vary across different levels of independent variable values.

   H_0: No Heteroscedasticity

   H_1: There is heteroscedasticity

3. Autocorrelation Test
   The autocorrelation test is used to test whether there is a correlation between the residual (error) values in the regression model. Autocorrelation occurs if there is a correlation pattern between residual values at different time intervals or observations. In the context of regression, autocorrelation indicates that errors in one observation can be correlated with errors in other observations.

   H_0: There is no Autocorrelation in the Model

   H_1: There is Autocorrelation in the Model

4. Spatial Effect Test
   The Lagrange Multiplier test is used to test whether there are spatial effects in the OLS model that we developed. The Lagrange Multiplier Test has the following hypothesis.

   H_0: No spatial effect

   H_1: There is a spatial effect

After all these tests have been fulfilled, we can use the OLS model in the analysis of variables that significantly influence the number of poor people. If the above test fails, rejectH_0 then the OLS model can be used.

Data and Data Sources

In this research, secondary data is used, which refers to data obtained from the Central Statistics Agency. These include the Open Unemployment Rate in East Java Province according to Regency/City in 2023, the Human Development Index in East Java Province according to Regency/City in 2023, and the Number of Poor People in East Java Province according to Regency/City in 2023. In this research, data processed using*software* GeoDa 1.22.0.2 and QGIS 3.32.3. The data used as material for analysis are as follows

$\boldsymbol{Y}$**=** Open Unemployment Rate

$\boldsymbol{X1}$= Human Development Index

$\boldsymbol{X2}$= Total Poor Population

RESULTS AND DISCUSSION

1. Descriptive Analysis

1.1 Open Unemployment Rate

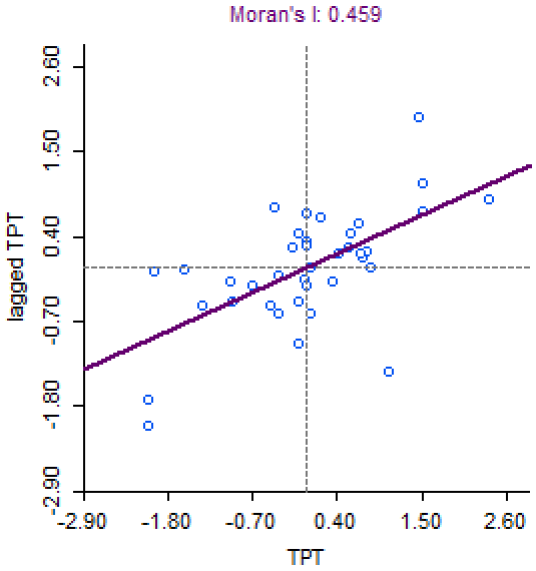

Figure 2. Moran's, I Index of Open Unemployment Rate

The open unemployment rate in East Java Province based on the Moran's I Index has a value of 0.459. Regency/City that has*lagged* the highest open unemployment rate is Surabaya City and the lowest is Bangkalan Regency. A Moran's I index that is greater than 0 indicates that there is a positive spatial cluster in the Open Unemployment Rate variable. This indicates that when the TPT in a district/city is high, its neighbors tend to have high TPT too.

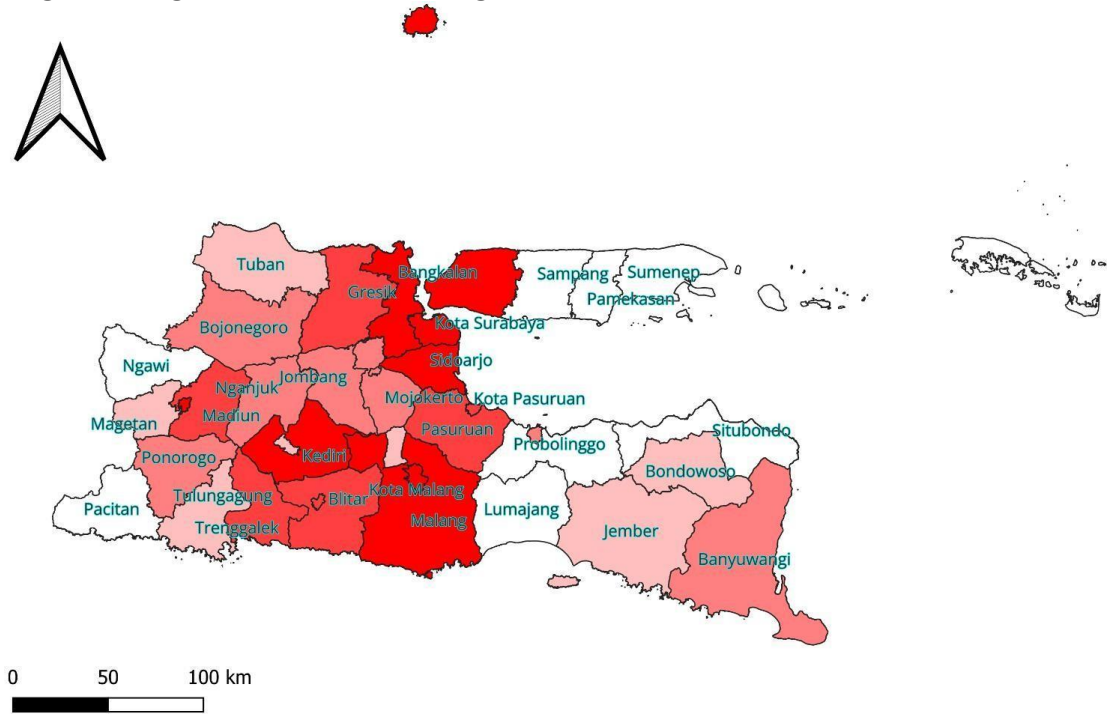

Figure 3. Open Unemployment Rate in QGIS Map

Visually on the map, it can be seen that high TPT from an area tends to be close to other areas that are also high. The cities of Malang and Blitar are areas that touch each other and have similar TPTs. Kediri is also surrounded by several districts such as Jombang, Mojokerto, Trenggalek, Batu City, Blitar, all of which have quite high TPT. Regions that have low TPT also do the same, such as Sampang, Pamekasan and Sumenep districts, all three of which are close together and have quite low TPT.

1.2 Total Poor Population

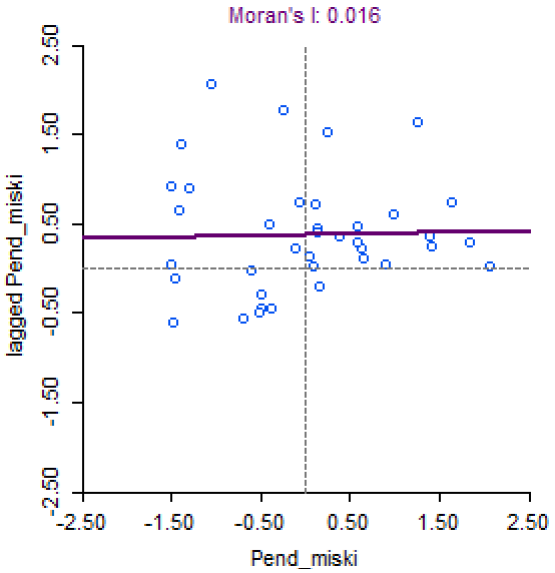

Figure 4. Moran's, I Index of Total Poor Population

The number of poor people in East Java Province based on the Moran's I Index has a value of 0.016. Regency/City that has*lagged* the highest number of poor people is Malang City and the lowest is Probolinggo Regency. A Moran's I index that is greater than 0 indicates that there is a positive spatial cluster in the Number of Poor Population variable. This indicates that when the number of poor people in a district/city is high, its neighbors tend to have a high number of poor people too.

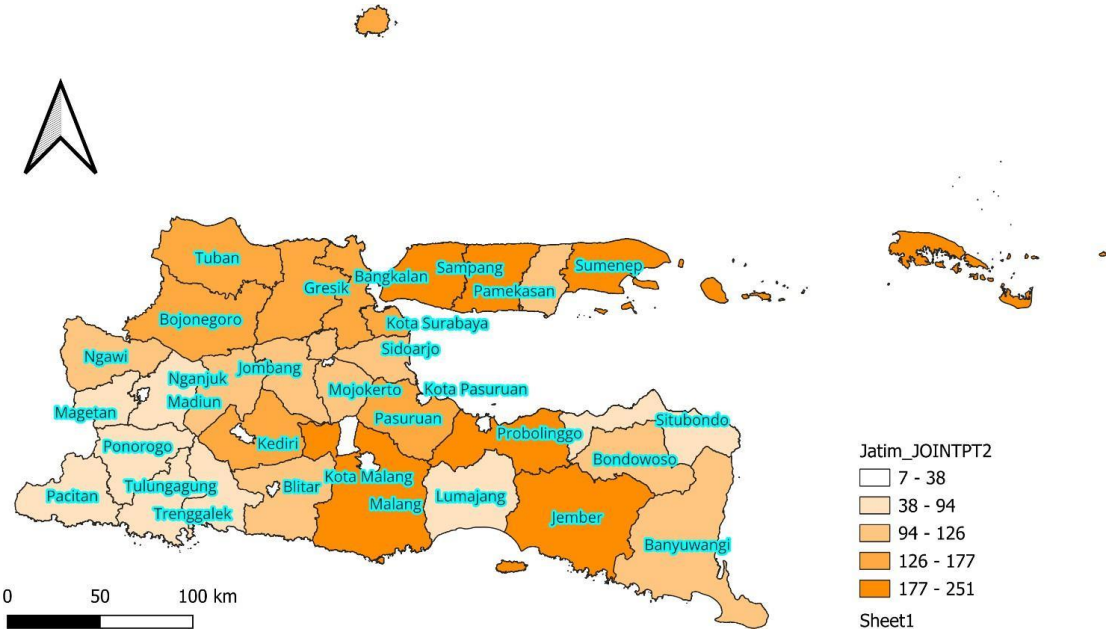

Figure 5. Total Poor Population in QGIS Map

Visually on the map, it can be seen that a high number of poor people in an area tends to be close to other areas which are also high. Jember and Probolinggo Regencies are areas that touch each other and have similar numbers of poor people. Tuban is also surrounded by districts such as Bojonegoro and Lamongan, all of which have quite high numbers of poor people. The same is true for areas with low numbers of poor people, such as Pacitan, Ponorogo and TulungAgung regencies, all three of which are close together and have quite low numbers of poor people.

1.3 Human Development Index

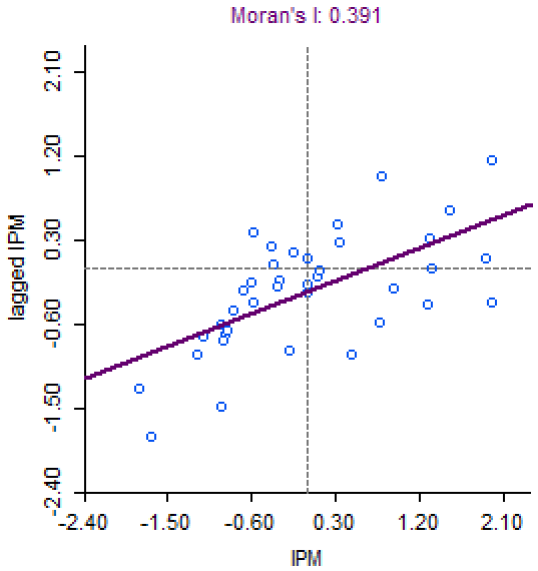

Figure 6. Moran's, I Index Human Development Index

The Human Development Index (HDI) in East Java Province based on the Moran's I Index has a value of 0.016. Regency/City that has*lagged* the highest HDI is Malang City and the lowest is Probolinggo Regency. A Moran's I index that is greater than 0 indicates that there is a positive spatial cluster in the Number of Poor Population variable. This indicates that when the number of poor people in a district/city is high, its neighbors tend to have a high number of poor people too.

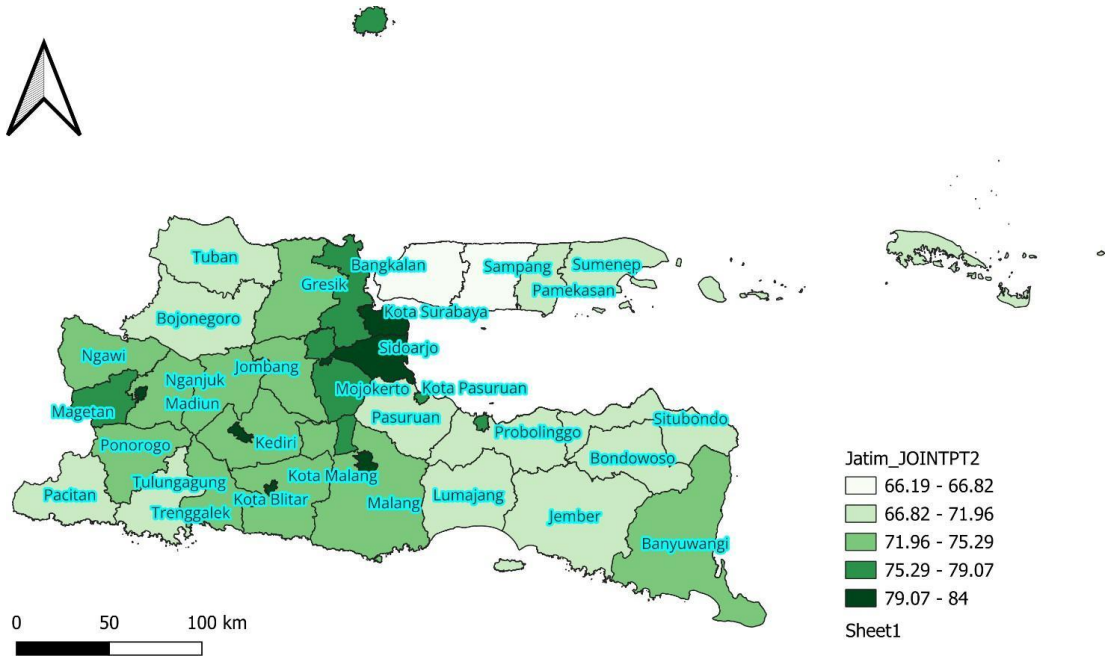

Figure 7. Human Development Index in the QGIS Map

Visually on the map, it can be seen that a high Human Development Index in an area tends to be close to other areas which are also high. Sidoarjo Regency and Surabaya City are areas that touch each other and have high HDI. Nganjuk Regency is also surrounded by districts such as Magetan, Ponorogo, Jombang and Mojonegoro, all of which have quite high HDI. Regions that have low HDIs also do the same, such as Pamekasan, Sampang and Sumenep regencies, all of which are close together and have quite low HDIs.

2. OLS analysis

Table 1. OLS Model Parameter Estimates

Variable	Coefficient	p-value
Constant	953.217	0.00000
TPT	18.9155	0.01388
IPM	-12.4687	0.00000

Based on*p-value*, it can be seen that the TPT and HDI variables influence the Number of Poor Population variable statistically significantly ($p - value < 0.05$). From this estimate, a value is obtained*Akaike info criterion* (AIC) of 408,758. The table above can be converted into a regression equation as follows

$Jumlah\ Penduduk\ Miskin$ = 953,217 + 18,9155$TPTi$ – 12,4687$IPMi$

From the equation above, it can be seen that every increase in the TPT number by 1 will increase the number of poor people by 18-19 people. Apart from that, every increase in HDI by 1 will reduce the number of poor people by 12-13 people.

Table 2. Testing OLS Assumptions

Test	Value	*p-value*	decision
Jarque-Berra	2.0126	0.36556	Failed to RejectH_0
Breusch-Pagan	0.5731	0.75083	Failed to RejectH_0
Lagrange Multiplier (*lag*)	0.160	0.68848	Failed to RejectH_0
Robust LM (*lag*)	2.5901	0.10753	Failed to RejectH_0
Lagrange Multiplier (*error*)	0.1331	0.71523	Failed to RejectH_0
Robust LM (*error*)	2.5625	0.10943	Failed to RejectH_0

2.1 Normality test

Normality testing was carried out using the Jarque-Berra method and produced results*p-value > 0,05* which indicates that the error has a normal distribution.

2.2 Heteroscedasticity Test

Heteroscedasticity testing was carried out using the Breusch-Pagan method and produced*p-value > 0,05* which indicates that variability*error* is constant along the level of the independent variable so that there is no influence of heterogeneity in the model

2.3 Spatial Effect Test

Testing was carried out using the Lagrange Multiplier method for the Lagrange Multiplier test (*error)* and Robust LM (*error)* which produce*p-value* > 0.05 which indicates that there is no deep spatial effect*error model* researched.

Because all assumptions are met, the OLS model can be used to explain the Number of Poor Population variable

CONCLUSION

It can be concluded that the variables TPT, HDI and Number of Poor Population are related between regions because they have a Moran's I Index > 0. In the OLS Analysis it can be concluded that the variable Number of Poor Population can be influenced statistically significantly by the variables Open Unemployment Rate and Human Development Index.

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