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Research Article

Analysis of Regional Balance in East Java Province

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Abstract: One of the goals of development is equity, balance, and justice. This study aims to analyze the regional balance in East Java Province. Using a quantitative approach, this study analyzes development disparities between regions in East Java province. The data used include indicators of regional balance from various districts or cities in East Java and see the relationship between the dependent variable Percentage of Poor Population and the independent variables Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP), and Open Unemployment Rate (OUR). The analysis method used is the primacy index to measure regional imbalance. The results showed that simultaneously, RMW, HDI, GRDP, and OUR have a significant effect on the percentage of poor people. At the same time, partially, there is a substantial effect of RMW on the percentage of poor people, there is a significant effect of HDI on the percentage of poor people, there is no significant effect of GRDP on the percentage of poor people, and there is no significant effect of OUR on the percentage of poor people.

Keywords: Primacy Index, Regional Balance, Regional Development.

1. Introduction

Improving human well-being is a major development goal of countries around the world, with a declaration known as the Millennium Development Goals (MDGs) made in 2000 in New York. The Millennium Development Goals (MDGs) program has successfully improved the well-being of the world's population during its 15 years of operation. After the program ended in 2015, it was followed by a broader program called the Sustainable Development Goals (SDGs). The SDGs have 17 goals, one of which is to reduce inequality within and between countries (UNDP, 2024).

East Java Province has a population of 40.49 million people, making it the province with the second largest population in Indonesia after West Java Province. In terms of the economy, the East Java region is one of the largest contributors to the proportion of Gross Domestic Product in Indonesia. In 2023, East Java's gross regional domestic product (GRDP) touched Rp1,844.81 trillion and contributed 15 percent of Indonesia's total gross domestic product in 2023 of Rp12,439.45 trillion. In terms of proportion, East Java is the second largest contributor to the Indonesian economy after DKI Jakarta. The magnitude of East Java's contribution indicates that the East Java region has a very large influence on the Indonesian economy. The large number of industrial areas and the abundance of both natural and human resources are some of the factors for the large proportion. The East Java economy in the fourth quarter of 2023 grew positively despite experiencing a slowdown compared to the previous quarter, which amounted to 4.69% (yoy). Every quarter, it grew by 0.89% (qtq), and cumulatively by 4.95% (ctc). Compared to other provinces in Java, East Java's economic growth in the fourth quarter of 2023 ranked fifth after DIY (5.07%, ctc), West Java (5.00%, ctc), Central Java (4.98%, ctc), and DKI Jakarta (4.93%, ctc), and. Meanwhile, Banten Province recorded a growth of 4.85%. The economy of East Java in the fourth quarter of 2023 as measured by GRDP at current prices (ADHB) amounted to Rp2,953.54 trillion, while GRDP at constant prices (ADHK) reached Rp1,844.81 trillion. The contribution of East Java GRDP to Java Island in 2023 amounted to 25.22% (ADHK). In the structure of East Java GRDP by expenditure, almost all components experienced positive growth except for Government consumption, which contracted slightly by 0.02% (yoy). Based on business

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fields, the Processing Industry managed to collect IDR 558.45 trillion (ADHK), or dominated 30.54% of the total GRDP (Central Bureau of Statistics (East Java DJPB Regional Office, 2024).

With all the potential it has, it certainly does not escape the problems associated with economic disparities between regions that also occur in East Java. As explained by Mudrajad Kuncoro (2010), the term "disparity" refers to differences in living standards among people as a whole. Different financing factors in each region lead to regional differences. These differences eventually lead to different levels of development and progress in each region, leading to differences in welfare between the regions. This difference is due to the development strategy, which has centered on economic growth since the New Order era. Development goals were aimed at attaining rapid economic growth, but did not prioritize equitable economic development in all regions of Indonesia, particularly East Java. In practice, the government simply sets growth targets, not equity targets. Each region has a different strategy, so not all regions can have equitable economic growth at the same time. However, the results of this growth strategy have created serious problems, namely income inequality. The industrial area in East Java is called "Gerbangkertasusila" where Gerbangkertasusila is a metropolitan area in East Java that integrates economic activities. However, the development of each Gatekertasusila area is not the same, causing differences in aspects such as income, land prices, infrastructure, and others. Gerbangkertasusila is also a type of region with nodality (point) that functionally depends on the center (core) and hinterland (back). Gerbangkertasusila stands for Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, and Lamongan also called Greater Surabaya or Surabaya Metropolitan Area, the Gerbangkertosusila agglomeration area centered on Surabaya City is the second largest metropolitan area in Indonesia after Jabodetabek which is centered in Jakarta and the largest agglomeration area in the Central Indonesia region (Nurlaili et al., 2018). In demography, the Gerbangkertosusila region has the second-largest population after Jabodetabek:

Table 1. Demographics of the Gerbangkertosusila region

Administrative Region	Area (km^2) 2022	Total Population (Soul) 2023	Population density (Soul/km^2) 2022
Gresik Regency	1.191,25	1.344.648	1.061
Bangkalan Regency	1.001,44	1.101.556	835
Mojekerto Regency	717,83	1.141.516	1.151
Mojokerto City	20,21	135.414	6.645
Surabaya City	350,54	2.893.698	8.595
Sidoarjo Regency	634,38	2.114.588	2.905
Lamongan Regency	1.782,05	1.386.941	783

Source: BPS Jawa Timur, 2024

Gerbangkertosusila (GKS) is an area that is included in the unit of development area in East Java Province. According to Glaeser and Khan (2003), this area has a leading sector in the industrial sector and has a close location so it becomes one of the agglomeration areas. Gerbangkertosusila is also a nodal area where this area is designated as an Integrated Economic Development Area (KAPET) by the Indonesian government through Presidential Regulation (Perpres) Number 52 of 2016. Surabaya, as the capital of East Java, is designated as the center of economic activity in the Gerbangkertosusila region. This makes Surabaya a nodal region in the region (Putra et al., (2022). A nodal region, also known as a functional region or polarized region, is a geographical area that shows a certain functional coherence (centralized tendency), and its parts are interdependent. This nodal region concept assumes the region as a living cell, which has a plasma (back area) and a core (node center) (Mahardika, 2019).

If economic development does not consider equity in each region, development may only occur in certain areas. As seen in Gerbangkertosusila, major development only occurs in the center of Surabaya City, which affects Sidoarjo and Gresik Regencies. One of the side effects of this centralized development is that the community is concentrated in one area, so the fulfillment of infrastructure is also concentrated in one area. Therefore, there will be differences in progress between regions, which have an impact on economic activity, with more developed areas getting more advanced and underdeveloped areas getting left behind.

this is in line with the statement of the Core-Periphery Theory where the Core-Periphery Theory is a concept used to explain the relationship and inequality between more developed areas (center) and less developed areas (periphery) in a regional economic system. It provides an understanding of how economic structure and power affect resource distribution and development. The Center-Periphery Theory was first developed by John Friedmann in the 1960s. The concept was later expanded by other economists and geographers to analyze economic inequality on both a national and international scale. The main point of this theory is that economic growth does not occur uniformly, but tends to be concentrated in certain locations that have competitive and dynamic advantages (Friedmann et al., 1996). The research that is aligned and becomes a reference is a research conducted by Michael Storper (1997) entitled "The Regional World: Territorial Development in a Global Economy", this research also analyzes development inequality between central and peripheral regions in the context of globalization.

Thus, it can be concluded that regional balance is very important to reduce development inequality, and this regional balance study aims to identify development inequality between one region and another in East Java Province. By knowing the causes and patterns of these inequalities, policies can be formulated to reduce disparities and promote equitable development. Therefore, this study has the aligned objective of analyzing the regional balance in East Java Province, especially the Gerbangkertosusila region, and offering policy recommendations to relevant parties in improving the quality of life of the community through more balanced economic development. From the description of several factors that influence this research, the problem formulations in this research are: 1) How is the condition of regional balance in the Gerbangkertosusila region calculated using a static approach, and which region dominates the most? 2) How is the influence of variables that have a relationship to the regional balance, and what are the results?

2. Literature Review

2.1. Regional Balance and Regional Development

Regional balance refers to the fair and equitable distribution of resources and development between regions within a country or province. In the context of regional development, regional balance is often measured through indicators such as per capita income, infrastructure, and access to public services. According to Myrdal (1957), in his theory of cumulative effects, regional imbalance occurs when more developed regions develop further while less developed regions are increasingly marginalized. Williamson (1965) also argued that regional imbalance tends to increase in the early stages of economic development and will only decrease when development reaches a higher level.

2.2 Economic Inequality and Uneven Development in East Java

Economic disparities between regions in East Java Province are often caused by differences in access to economic resources, infrastructure, and government policies. A study by Sumarto (2006) found that economic disparities between regions in East Java are influenced by factors such as the level of urbanization, industrial concentration, and regional fiscal policies. This uneven development is also reinforced by differences in regional competitiveness, where areas such as Surabaya and its surroundings tend to be more advanced than areas in the eastern and southern parts of the province.

2.3 The Impact of Decentralization Policy on Regional Balance

The implementation of decentralization policies in Indonesia, including in East Java Province, aims to reduce regional inequality by increasing regional autonomy and more equitable resource allocation. Rodríguez-Pose and Gill (2004) stated that decentralization can help reduce inter-regional inequality if followed by appropriate policies and effective local participation. However, in some cases, decentralization can worsen inequality if less developed regions are unable to utilize the autonomy granted

3. Method

This study employs a quantitative research method, utilizing secondary data obtained from the Central Bureau of Statistics (BPS) of East Java Province. The analysis focuses on regional disparities using a static spatial equilibrium approach. The data comprises indicators of regional balance, specifically the primacy index, with the Percentage of Poor People as the

dependent variable (Y), and the Regional Minimum Wage (X_1), Human Development Index (X_2), Gross Regional Domestic Product (X_3), and Open Unemployment Rate (X_4) as independent variables. The model applies panel data analysis, processed using EViews 12 and Microsoft Excel 16 software. The research covers multiple districts and cities within East Java Province over a five-year period, from 2019 to 2023.

3.1. *Primacy Index*

The Primacy Index is a measure used in geographic analysis to measure the extent to which a country or region is dominated by one main center or major city (Rustiadi, 2009). The formula for calculating the Primacy Index is:

$$\textit{Primacy Index} = \frac{\textbf{Population of the Largest City}}{(\textbf{Population of the Second Largest City} + \textbf{Population of the Third Largest City})}$$

Where:

- Population of the Largest City refers to the total number of inhabitants in the most populous city within the region.
- The population of the Largest City denotes the number of residents living in the second most populous city in the region.
- The population of the third-largest city indicates the total population of the third most populous city in the region

Interpretation:

1. A Primacy Index value > 1 indicates a primacy or high concentration of economic activity in the largest city compared to other cities in the region. The larger the value, the higher the level of primacy or unequal distribution of economic activity and population in the largest city.
2. Primacy Index value = 1. Indicates there is no primacy or concentration of economic activity in one particular city. The distribution of economic activity and population is evenly distributed among the major cities in the region.
3. Primacy Index value < 1 Rarely occurs in real situations, as this value implies that the population of the largest city is smaller than the next two cities combined.

In general, higher values of the Index of Primacy (well above 1) indicate a high degree of regional inequality, with economic activity and population concentrated in one main city. Whereas a Primacy Index value closer to 1 indicates a more balanced and equitable pattern of urban development (Todaro et al., 2015).

3.2. Operational Definition of Variables

1. Dependent variable (Y)
   Percentage of Poor Population (PPM) (Y)

The percentage of poor people serves as an indicator to assess poverty levels within a region or country. It reflects the proportion of the population whose income or expenditure falls below the established poverty line. The poverty line itself represents the minimum amount of spending needed to fulfill essential food and non-food requirements. Individuals are classified as poor if their per capita monthly expenditure is less than this threshold. A higher percentage indicates a larger segment of the population living in poverty, struggling to meet their necessities (BPS, 2024).

2. Independent Variable (X)
   a. Regional Minimum Wage (RMW) (X_1)

The Regional Minimum Wage (RMW) is the lowest wage level established by the governor as a safeguard, applicable within a province, based on the standard of decent living and considering factors such as productivity and economic growth (BPS, 2024). RMW is a very important aspect for business actors and the community. the higher the RMW, the more business actors will think twice about doing business activities in that location. but the opposite is the desire of the community; the higher the RMW value, the more the community will go (Nurlaili et al., 2018).

   b. Human Development Index (HDI) (X_2)

The Human Development Index (HDI) is an indicator used to measure the quality of human life in a country. HDI was created by the United Nations (UN) through its program United Nations Development Programme (UNDP), in 1990. The HDI is a composite indicator calculated as the average of the three dimensions. HDI

values range from 0 to 1, with higher values indicating better levels of human development (UNDP, 2024).

c. Gross Regional Domestic Product (GRDP) (X_3)

Gross Regional Domestic Product (GRDP) represents the total value added of goods and services produced through all economic activities within a specific region. It is measured using two pricing approaches: current prices and constant prices. GRDP at current prices reflects the value based on prices in the reporting year, while GRDP at constant prices is calculated using the prices from a selected base year, with 2000 set as the base year in this context (Nurlaili et al., 2018). This study utilizes GRDP based on constant prices.

d. Open Unemployment Rate (OUR) (X_4)

The open unemployment rate, in an economic context, refers to the number of people who do not have a job and are not looking for one. In a more specific definition, the open unemployment rate counts people who do not have a job, are not looking for work, and are not in the process of training or education to improve their employability. In some studies, the open unemployment rate is also calculated based on the number of people who do not have a job and are not looking for work, are not in the process of training or education to improve their employability, and are not in the process of unstructured unemployment such as unemployment caused by technological changes or market changes (Ayu, 2018).

4. Results and Discussion

Regional balance is also closely related to the distribution of income. Regional imbalances can lead to disparities in income distribution as economic resources and opportunities become concentrated in specific regions. distribution, as economic resources and opportunities tend to cluster in particular regions (Rodríguez-Pose & Tselios, 2009). Conversely, equitable development across various regions can improve overall income distribution (Kanbur & Venables, 2005). (Kanbur & Venables, 2005). Various policies have been implemented to address the problem of income distribution inequality and regional balance. For example, progressive taxation, income transfer, and investment in underdeveloped regions (Bourguignon, 2015). (Bourguignon, 2015). However, the success of these policies is highly dependent on the social, economic, and political context in each country. This research uses Spatial Balance, which can be measured in two ways, namely through static and dynamic approaches. The static approach is done by measuring the development gap between regions. The economic development gap between regions can be described by comparing Gross Regional Domestic Product (GRDP), GRDP growth, or GRDP per capita between regions. More measurable static gaps between regions can be done by using spatial gap indices such as the Primacy Index

4.1. Primacy Index

The Primacy Index is a measure used to analyze the primacy or concentration of economic activity in a particular area, especially in large cities or metropolitan areas. It is often used in urban studies and regional development. In addition, the Primacy Index can be a measure of the dominance of one or several cities or major economic agglomeration centers over the region as a whole (Rustiadi et al., 2009). The following are the results of the Primacy Index in East Java Province from 2019 to 2023:

Table 2. Primacy Index of the Gerbangkertosusilo Region

No.	Year	Regency/city	Jumlah Penduduk	(pi)	Interpretation
1	2019	Surabaya City	2.896.195	1,23	Shows the existence of primacy or high concentration of economic activity in the city of Surabaya compared to Sidoarjo Regency and Gresik Regency in one area.
		Sidoarjo Regency	2.249.476		
		Gresik Regency	1.312.881		

2	2020	Surabaya City	2.874.314	1,18	Shows the existence of primacy or high concentration of economic activity in the city of Surabaya compared to Sidoarjo Regency and Gresik Regency in one area.
		Sidoarjo Regency	2.082.801		
		Gresik Regency	1.311.215		
3	2021	Surabaya City	2.880.284	1,20	Shows the existence of primacy or high concentration of economic activity in the city of Surabaya compared to Sidoarjo Regency and Lamongan Regency in one area.
		Sidoarjo Regency	2.091.930		
		Lamongan Regency	1.356.027		
4	2022	Surabaya City	2.887.223	1,20	Shows the existence of primacy or high concentration of economic activity in the city of Surabaya compared to Sidoarjo Regency and Lamongan Regency in one area.
		Sidoarjo Regency	2.103.401		
		Lamongan Regency	1.371.509		
5	2023	Surabaya City	2.893.698	1,21	Shows the existence of primacy or high concentration of economic activity in the city of Surabaya compared to Sidoarjo Regency and Lamongan Regency in one area.
		Sidoarjo Regency	2.114.588		
		Lamongan Regency	1.386.941		

Source: processed by researchers, 2024

From the data above, it can be analyzed that the 7 Gerbangkertosusila regions consist of Gresik Regency, Bangkalan Regency, Mojokerto Regency, Mojokerto City, Surabaya City, Sidoarjo Regency, and Lamongan Regency. Surabaya City has occupied the first place as the region with the most residents for five consecutive years. Furthermore, followed by the second place by Sidoarjo Regency which is not much different from Surabaya City, where Sidoarjo Regency also occupied the second place for five consecutive years and the last is followed by Gresik Regency which occupied the third place for two years, namely in 2019, and 2020 and was replaced by Lamongan Regency for three consecutive times, namely in 2021 to 2023.

4.2 Descriptive analysis

Descriptive analysis aims to identify the characteristics of the variables under study, including determining the minimum, maximum, mean, and standard deviation values of those variables.:

Table 3. Descriptive analysis

Variabel	Mean	Median	Maximum	Minimum	Std. Dev.
Y	9.863548	9.800000	21.57000	4.510000	5.202933
X_1	3,387,392	3,867,874	4,525,479	1,954,706	1,001,271
X_2	76.34258	77.96000	83.45000	64.11000	5.539992
X_3	13,446.20	60,198.70	715,294.7	4,801.500	170,269.9
X_4	6.768710	6.740000	10.97000	2.630000	2.043319

The results of the descriptive analysis indicate that the PPM in the seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, the lowest was 4,510 in Surabaya City, then the highest was 4,510 in Bangkalan Regency. The average PPM in the seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023 was 9.86% with a standard deviation of 5.20% and a mean value of 9.8%. This means that the PPM in the seven Gerbangkertosusila areas from 2019 to 2023 was centered at 9.9 ± 5.20%.

The RMW in the seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, the lowest was 1,954,706 in Bangkalan Regency, then the highest was 4,525,479 in Surabaya City. The average RMW in the seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023 was 3.39% with a standard deviation of 1% and a mean value of 3.9%. This means that the RMW in the seven Gerbangkertosusila areas from 2019 to 2023 was centered at 3.39 ± 1%.

The HDI in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, the lowest was 64.11 in Bangkalan Regency, then the highest was 83.45 in Surabaya City. The average HDI in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, was 76.34% with a standard deviation of 5.54% and a mean of 77.10%. This means that the HDI in the seven Gerbangkertosusila areas from 2019 to 2023 was centered at 76.3 ± 5.54%.

The GRDP in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, was the lowest at 4,802 in Mojokerto City, then the highest at 715,295 in Surabaya City. The average GRDP in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023 was 134,462% with a standard deviation of 170,270% and a mean of 60,199%. This means that the GRDP in the seven Gerbangkertosusila areas from 2019 to 2023 was centered at 134,462 ± 170,270%.

The OUR in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023, the lowest was 2.63 in Mojokerto City, then the highest was 10.97 in Sidoarjo Regency. The average OUR in seven Gerbangkertosusila areas, including 4 regencies and 2 cities, from 2019 to 2023 was 6.77% with a standard deviation of 2.04% and a mean of 6.74%. This means that the OUR in the seven Gerbangkertosusila areas from 2019 to 2023 was centered at 6.77 ± 2.04%.

4.3 An Analysis of the Impact of Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP), and Open Unemployment Rate (OUR) on the Percentage of the Poor Population (PPM).

This study applies panel data regression analysis to model the relationship between the RMW, HDI, and GRDP, which measure welfare, and the OUR as independent variables, with the Percentage of Poor Population in the Gerbangkertosusila area as the dependent variable.

Model Selection Test Results

a. Testing Effect Selection in Panel Regression Estimation Models Using the Chow Test

The Chow test is used to determine the appropriate panel regression estimation model, whether using the Common Effect Model (CEM) or the Fixed Effect Model (FEM). This test is carried out by formulating the following hypotheses:

H_0 : The appropriate model is the Common Effect Model (CEM)
H_1 : The appropriate model is the Fixed Effect Model (FEM)

The decision-making criteria are based on the chi-square test statistic and its probability value. If the probability is less than the significance level ($\alpha = 5\%$), the null hypothesis (H_0) is rejected, indicating that the Fixed Effect Model (FEM) is the best fit. If the probability exceeds or equals the significance level (α), H_0 is accepted, indicating that the Common Effect Model (CEM) is better suited for empirical data. The table below shows the results of assessing the model effects using the Chow test.

Table 4. Chow test

Statistic	Prob
72.262683	0.0000

Prob value 0.0000 < 0.05, then the selected model is the FEM model.

b. Testing the Selection of Effects in the Panel Regression Estimation Model Using the Hausman Test

The Hausman test is one of the tests used to determine the most appropriate panel regression estimation model, whether using a fixed effect model or a random effect model.

H_0: Fixed Effect Model (FEM)
H_1: Random Effect Model (REM)

Table 5. Hausman test

Statistic	Prob
4.673164	0.3225

Prob value 0.3225 > 0.05, then the selected model is the REM model.

c. Testing the Selection of Effects in the Panel Regression Estimation Model Using the Lagrange Multiplier Test

The Lagrange Multiplier test is used to determine whether the Random Effect Model (REM) is better than the Common Effect Model (CEM).

H_0 : Common Effect Model (CEM)
H_1 : Random Effect Model (REM)

The Lagrange Multiplier (LM) test uses a chi-square distribution with degrees of freedom proportional to the number of independent variables. The decision rule is as follows: if the probability value is larger than or equal to the significance level (α = 5%), then the null hypothesis (H_0) is accepted. This indicates that the suitable panel regression estimation model is the Common Effect Model. If the probability value is less than the significance level (α = 5%), H_0 is rejected. This indicates that the Random Effect Model (REM) is better suited for the actual data. The table below shows the results of testing the model effects using the LM test..

Table 7. Lagrange Multiplier test

Breusch-pagan	Prob
24.67800	0.0000

Prob value 0.000 < 0.05, then the selected model is the REM model. Based on the results of the Chow Test, the Hausman Test, and the LM Test, the best model in this study is REM.

4.4 Classical Assumption Test Results

a. Normality Assumption

The normality test evaluates whether the residuals in the regression model follow a normal distribution. This assumption is verified using the Jarque-Bera test, where normality is established when the test's probability value (p-value) exceeds the predetermined significance level (α). The decision rule for normality assessment is as follows:

Test criterion:

- If p-value > α (typically 0.05): Residuals are normally distributed
- If p-value ≤ α: Residuals deviate from normality

Below are the detailed results of the Jarque-Bera normality test:

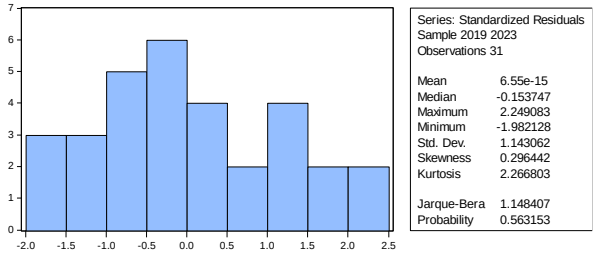

Figure 1. Normality Assumption

The normality assumption test produces a Jarque-Bera test statistic of 1.148 with a probability of 0.563. This result indicates that the probability is > the level of significance (α = 5%). This means that the residuals are normally distributed. Thus, the normality assumption is met.

b. Multicollinearity Assumption

The multicollinearity test is used to determine whether there is a relationship between independent variables. In this assumption, it is expected to be done by looking at the correlation value between the independent variables. The provisions are the correlation coefficient value of X_1 and X_2 <0.85, X_1 and X_3 <0.85, X_1 and X_4 <0.85 The following is a multicollinearity test:

	X1	X2	X3	X4
X1	1.000000	0.647848	0.599062	0.335060
X2	0.647848	1.000000	0.615478	0.137065
X3	0.599062	0.615478	1.000000	0.324918
X4	0.335060	0.137065	0.324918	1.000000

Figure 2. Multicollinearity Assumption

Based on the output above, the correlation coefficients of X_1 and X_2 are 0.647848 < 0.85, X_1 and X_3 are 0.599062 < 0.85, and X_1 and X_4 are 0.335060 < 0.85. Thus, the regression model formed does not contain multicollinearity symptoms.

c. Heteroscedasticity Assumption

The heteroscedasticity test serves to verify whether the regression model's residuals maintain homoscedasticity (constant variance) across observations. This diagnostic procedure is crucial as valid regression analysis requires the residual variance to remain stable. The test aims to confirm the fulfillment of this homogeneity assumption. Below are the heteroscedasticity test results:

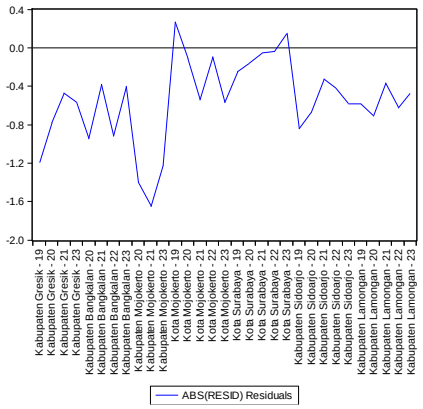

Figure 3. Heteroscedasticity Assumption

The residual plot analysis (depicted in blue) demonstrates that all data points remain within the acceptable range of ±500, without breaching these boundaries. This graphical pattern indicates:

- Homoscedasticity is present (constant residual variance)
- No evidence of heteroscedasticity in the model
- Successful fulfillment of the heteroscedasticity assumption

These findings are consistent with the methodological standards established by Napitulu et al. (2021) for variance homogeneity testing.

d. Autocorrelation Assumption

The autocorrelation test is used to determine whether observations from residuals are correlated or not. The autocorrelation assumption test is expected to have uncorrelated residual observations. The autocorrelation assumption test can be seen through the Durbin-Watson (DW) test. The findings are as follows autocorrelation assumption test:

Table 8. Autocorrelation Assumption

Durbin Watson Statistic	1.709879

The Durbin-Watson (DW) test evaluates whether residuals in the model are correlated. The decision rule follows: A DW value close to 2 indicates no autocorrelation, and A value

approaching 0 suggests positive autocorrelation. The analysis yielded a DW statistic of 1.709879, which is near the ideal value of 2. This confirms that: No significant autocorrelation exists between residuals and the model satisfies the autocorrelation assumption.

4.5 Results of Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP) and Open Unemployment Rate (OUR) Estimation of Poor Population.

The results of testing the RMW, HDI, GRDP, and OUR against the Percentage of Poor Population. The table below shows:

Table 8. Estimation Results

Variable		Koefisien	Std Error	Tstatistic	Prob
RMW		1.58E-06	7.28E-07	2.171	0.039
HDI		-0.932	0.144	-6.469	0.000
GRDP		6.02E-07	1.77E-06	0.340	0.736
OUR		0.081	0.069	1.185	0.246
Konstanta		74.985	9.456	7.929	0.000
F-statistic	= 16.956	R-squared		= 0.722	
Prob.	= 0.000	Adj. R-squared		= 0.680	

4.6 Determination Coefficient Testing

The combined influence of the Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP), and Open Unemployment Rate (OUR) on the Percentage of Poor Population (PPM) is measured by the adjusted R^2 value of 0.68 (68%). These four factors account for 68% of the variation in poverty rates. The remaining 32% of variation is related to variables not examined in this study.

4.7 Hypothesis Testing

1. Simultaneous Hypothesis Testing

   This test evaluates whether the Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP), and Open Unemployment Rate collectively affect the Percentage of Poor Population . The decision rule is as follows:

   If the F-statistic ≥ F-table or the p-value < significance level (α), then these variables jointly have a significant impact on PPM.

   The test yields an F-statistic of 16.956 with a p-value of 0.000. Since the F-statistic (16.956) > F-table (2.690) and the p-value (0.000) < significance level (α = 0.05), we conclude that RMW, HDI, GRDP, and Open Unemployment Rate together significantly influence the Percentage of Poor Population.

2. Partial Hypothesis Testing

   Partial hypothesis testing determines whether each independent variable, RMW, HDI, GRDP, and OUR, has a significant individual effect on the Percentage of Poor Population (PPM).

   Decision Rule:

   If |t-statistic| ≥ t-table or p-value < significance level (α = 0.05), the variable has a significant influence on PPM.

   Test Results:

   a. Partial Hypothesis Test of Regional Minimum Wage (RMW) on the Percentage of Poor Population

      Partial hypothesis testing of RMW on the Percentage of Poor Population. produces a calculated t value of 2.171 with a probability of 0.039. The test results show | t-test statistic | < | t table | (2.035) and probability < level of significance (a = 5%). This means that there is a significant influence of the RMW on the Percentage of the Poor Population.

b. Partial Hypothesis Test of Human Development Index (HDI) on the Percentage of Poor Population

Partial hypothesis testing of the HDI on the Percentage of Poor Population produces a t-value of -6.469 with a probability of 0.000. The test results show | t-test statistic | > | t table | (2.035) and probability < level of significance (a = 5%). This means that there is a significant influence of the HDI on the Percentage of Poor Population

c. Partial Hypothesis Test of Gross Regional Domestic Product (GRDP) on the Percentage of Poor Population

Partial hypothesis testing of GRDP on the Percentage of Poor Population produces a t-value of 0.340 with a probability of 0.736. The test results show | t-test statistic | > | t table | (2.035) and probability > level of significance (a = 5%). This means that there is no significant influence of GRDP on the Percentage of Poor Population.

d. Partial Hypothesis Test of Open Unemployment Rate (OUR) against the Percentage of Poor Population

Partial hypothesis testing of the OUR on the Economic Growth Rate produces a t-count value of 1.185 with a probability of 0.246. The test results show | t-test statistic | > | t table | (2.035) and probability > level of significance (a = 5%). This suggests there is no significant partial effect of the OUR on the Percentage of Poor Population.

e. Constant Partial Hypothesis Test on the Percentage of Poor Population

Furthermore, partial hypothesis testing of the constant produces a t-count value of 7.929 with a probability of 0.000. The test results show | t-test statistic | > | t table | (2.035) and probability < level of significance (a = 5%). This signifies that there is a large portion of influence of the constant on the Percentage of Poor Population.

DISCUSSION

Empirical Panel Regression Model

The regression equation from the panel regression analysis estimation results is:

$$\mathbf{Y = 74.98 + 1.58*X1 - 0.93*X2 + 6.01*X3 + 0.08*X4}$$

Interpretation of the Regression Analysis:

1. The constant number of 74.9 means that if the Regional Minimum Wage (RMW) (X_1), Human Development Index (HDI) (X_2), Gross Regional Domestic Product (GDP) (X_3), and Open Unemployment Rate (X_4) are all zero, the Percentage of Poor Population (PPM) (Y) would increase by 74.9%.
2. For the RMW variable (X_1), the beta coefficient of 1.58 suggests that a 1% increase in RMW (holding other variables constant) leads to a 1.58% rise in PPM (Y). Conversely, a 1% decrease in RMW results in a 1.58% decline in Y.
3. The HDI variable (X_2) has a beta coefficient of -0.93, meaning a 1% increase in HDI (with other factors unchanged) causes PPM (Y) to drop by 0.93%. If HDI decreases by 1%, Y increases by 0.93%.
4. The GDP variable (X_3) shows a beta coefficient of 6.01, implying that a 1% increase in GDP (while keeping other variables steady) raises PPM (Y) by 6.01%. A 1% reduction in GDP leads to a 6.01% fall in Y.
5. The OUR (X_4) has a beta coefficient of 0.08, indicating that a 1% increase in unemployment (with other variables fixed) results in a 0.08% rise in PPM (Y). Similarly, a 1% decrease in unemployment leads to a 0.08% decline in Y.

5. Comparison

This study's findings align with and diverge from existing literature in several key aspects. Similar to prior research by Muhammad Reza et al, (2019), the results confirm that the Human Development Index (HDI) has a significant negative impact on poverty rates, reinforcing the well-established relationship between human capital development and poverty reduction. However, while earlier studies such as Siska Amelia and Guswandi, (2023) identified Gross Regional Domestic Product (GRDP) as a major poverty determinant, this study found no

statistically significant effect, suggesting regional economic growth alone may not suffice without equitable distribution policies. Additionally, the Regional Minimum Wage (RMW) exhibited a stronger positive correlation with poverty in this analysis compared to Rohmi nurlaila (2018), potentially reflecting localized labor market dynamics. Notably, the Open Unemployment Rate (OUR) showed insignificant influence here, contrasting with [Author/s, Year]'s findings, possibly due to differing methodologies or contextual factors like informal employment prevalence. These comparisons highlight the importance of region-specific analyses in poverty studies, as universal assumptions may not hold across diverse socioeconomic contexts.

6. Conclusions

By identifying the main areas in the East Java region as economic centers, we can use the Primacy Index to calculate development inequality. The Primacy Index is a measure used to analyze the priority or concentration of economic activities in a particular region, especially in a city or town. This study will focus on the three most populous regions in East Java. The results of this Primacy Index show that the average priority value is greater than 1, which indicates that the priority or concentration of the economy is higher in Surabaya City than in other regions. Furthermore, based on the data and discussion previously described, regarding the Regional Minimum Wage (RMW), Human Development Index (HDI), Gross Regional Domestic Product (GRDP), and open unemployment rate (OUR) to the Percentage of Poor Population, the following conclusions can be drawn:

1. As for the research results of the Regional Minimum Wage (RMW), the RMW significantly affects the Percentage of Poor People. This means that the increase and decrease in the percentage of poor people proxied by the RMW value affect the rise in balanced development in East Java.
2. As for the research results of the Human Development Index (HDI), there is a significant effect of the HDI on the percentage of poor people. This means that the increase and decrease in the percentage of poor people, proxied by the value of HDI, affect the rise in balanced development in East Java.
3. As for the research results of Gross Regional Domestic Product (GRDP), there is no significant effect of GRDP on the percentage of poor people. This means that the increase and decrease in the percentage of poor people proxied by the value of GRDP does not affect the increasing balanced development in East Java.
4. As for the research results of the Open Unemployment Rate (OUR), there is no significant effect of the OUR on the percentage of poor people. This means that the increase and decrease in the percentage of poor people proxied by the value of OUR does not affect the increasing balanced development in East Java.

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