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A Spatial Econometric Approach on Addressing Determinants of Regional Inequality

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Abstract

The disparity in socioeconomic conditions across Banten Province is suspected to contribute to regional inequality, stemming from uneven economic development. This is evidenced by certain areas with significantly higher economic levels than others. This study uses correlational and spatial approaches to analyze the influence of these socioeconomic conditions on the high level of regional inequality in Banten Province. The socioeconomic variables examined include the Human Development Index (HDI), labor force participation rate, poverty rate, base economic sector, and economic growth. The findings indicate that the poverty rate significantly correlates with regional inequality in a non-spatial context. Meanwhile, the base economic sector (particularly manufacturing) and economic growth show significant spatial effects on regional inequality.

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INTRODUCTION

Indonesia, as the 15th largest archipelagic country and the 4th most populous nation in the world, with an estimated population of 270.2 million people, possesses enormous economic potential (Sunoko et al., 2022). The country's abundant natural resources, including mining, energy, fisheries, and forestry, drive this potential. Additionally, Indonesia's large population contributes to a substantial domestic market, which attracts investment across various sectors such as manufacturing, trade, and technology. These factors position Indonesia as one of the emerging economies with promising prospects in global competition. However, the country also faces serious challenges, including sustainable development, climate change, poverty, and unemployment (Nugroho et al., 2023).

The vast geographical size of Indonesia presents a major challenge in the form of inequality, which is reflected in the uneven distribution of the population and disparities in access to infrastructure, education, and healthcare among regions (Haemmerli et al., 2021; Raharjo & Pudjiastuti, 2024; Solihin et al., 2021). Java Island, the center of governance and the economy, typically receives more development funding than outer regions such as Papua, Nusa Tenggara, and parts of Sulawesi and Kalimantan. Rugged topography, limited transportation access, and uneven resource distribution exacerbate these disparities. As a result, some areas experience higher poverty rates and lower economic growth than others. Spatial econometric studies confirm that economic development in Indonesia contributes to regional inequality and exhibits spatial interaction effects (Belantika et al., 2023; Miranti & Mendez, 2023).

Banten Province serves as a clear example of these dynamics. It has a relatively dense population, particularly in areas adjacent to the capital city. South Tangerang City has the highest population, while Cilegon City has the lowest (Fitriyah et al., 2024). Located at the western tip of Java Island, Banten has strategic geographic advantages due to its proximity to Jakarta, the political and economic center of the country. While this proximity supports rapid growth in cities such as Tangerang, which are emerging as industrial and commercial hubs, other regions, such as Lebak and Pandeglang, struggle with underdeveloped infrastructure and higher poverty levels.

This disparity illustrates the common developmental challenge across Indonesia, where economic centers proliferate while more peripheral areas are left behind. South Tangerang City recorded the highest Gross Regional Domestic Product (GRDP) in Banten Province, amounting to IDR 54,676.79 billion. This reflects its key role as an economic hub, supported by industry, trade, and services sectors. As part of the Greater Jakarta metropolitan area, South Tangerang benefits significantly from integrating with the national capital, which drives the rapid growth of the real estate sector, retail areas, and commercial zones. However, the persistent gap between regions in Banten underscores the broader issue of unequal development in Indonesia.

Several studies have identified socioeconomic conditions as significant determinants of regional inequality (Carrera et al., 2021; Gu et al., 2022; Hidayat et al., 2023; Huluka, 2024; Lazăr et al., 2021). Disparities in access to education, healthcare, and essential infrastructure across regions can intensify existing inequalities. Regions with favorable socioeconomic conditions typically demonstrate higher productivity, greater competitiveness, and broader access to employment and investment opportunities. In contrast, areas with limited socioeconomic capacity often remain trapped in a cycle of poverty, characterized by low economic output and heavy reliance on external assistance. Factors such as urbanization, resource allocation, and government policies play a critical role in either aggravating or alleviating the impacts of inequality resulting from socioeconomic differences.

Variations in socioeconomic indicators—such as access to quality education, healthcare services, decent employment, and poverty levels are widely considered to influence regional

inequality (Aritenang & Chandramidi, 2022; Duana Ávila & Hernández Gracia, 2021; Jagódka & Snarska, 2023). Areas with sufficient infrastructure and better access to basic services tend to experience faster and more sustainable development than those with limited facilities. For instance, regions with strong educational infrastructure are more likely to produce competitive human capital, which drives local economic growth. Similarly, access to adequate healthcare enhances workforce productivity. In contrast, regions with high poverty rates often struggle to escape the poverty cycle due to constrained access to quality education, health services, and employment opportunities. Geographical barriers, such as remoteness and limited connectivity, further exacerbate these challenges by restricting investment inflows and equitable distribution of resources.

Given the critical role of socioeconomic factors in shaping regional inequality, this study seeks to analyze the influence of key socioeconomic variables on regional disparities within Banten Province. The research aims to provide insight into the direct relationship between socioeconomic indicators and regional inequality, as well as the presence of spatial interactions, where changes in the socioeconomic conditions of one region may affect inequality outcomes in neighboring areas. Through this analysis, the study is expected to contribute to a deeper understanding of the mechanisms that drive inequality and to inform more equitable development strategies at the regional level.

RESEARCH METHODS

This study adopts a quantitative research approach with a correlational design, aiming to examine the relationship between independent variables and the dependent variable. The analysis covers eight districts and cities within Banten Province: Lebak Regency, Pandeglang Regency, Serang Regency, Tangerang Regency, Cilegon City, Serang City, Tangerang City, and South Tangerang City. The dependent variable (Y) is regional inequality, measured using the Theil Entropy Index. The independent variables represent socioeconomic conditions in Banten Province, including the Human Development Index (HDI), Labor Force Participation Rate (LABOR), Number of Poor Population (HCI-P0), and Gross Regional Domestic Product at constant prices (GDRP). The GDRP is further disaggregated into several sectors: Sector C (Manufacturing), Sector E (Water Supply), Sector H (Transportation and Warehousing), and Sector L (Real Estate). Economic growth (PE) is also included as an independent variable.

The data used in this study are secondary data obtained from the Central Statistics Agency (BPS) and previous research findings. The analytical method employed is spatial regression using the Spatial Durbin Model (SDM). The SDM extends the traditional Ordinary Least Squares (OLS) regression by incorporating spatial weights to identify spatial interactions across regions, where changes in the independent variables of one area may influence neighboring areas (Koley & Bera, 2024). The general form of the SDM equation is as follows:

$$yi = \rho \sum_{j=1}^{n} W_{ij} y_j + \alpha + \sum_{k=1}^{p} = \beta_k x_{ki} + \sum_{k=1}^{p} \sum_{j=1}^{n} \theta_k (W_{ij}\, x_{kj}) + \epsilon_i \quad \text{..... (1)}$$

Where y is Vector of response variables, size n x 1; X is Predictor variable matrix, size n x p; Z is $[\ 1_n\ X\ WX]$; δ is $\begin{bmatrix} \alpha \\ \beta \\ \theta \end{bmatrix}$; ρ is the Spatial lag coefficient of the response variable (Y); α is the Constant Parameters; β is Regression parameter vector, size p x 1; θ is Vector spatial lag parameter variable predictor size p x 1; W = weighted matrix, measuring n x n; and E is Error vector, size n x 1.

Spatial dependence is tested using Pesaran's test to detect potential spatial spillovers, where conditions may influence outcomes in one region in neighboring regions. The core premise of this test is that a statistically significant result indicates the presence of spatial dependence in the data. This study employs the Queen Contiguity Spatial Weight Matrix to define the spatial relationships between geographic units (such as regions, districts, or provinces). This matrix considers both shared

borders and shared corners between spatial units, similar to how a queen in chess moves in all directions, including diagonally.

RESULTS AND DISCUSSION

According to the analysis of the Intra Theil Entropy Index in Table 1, the development inequality between districts and cities in Banten Province from 2013 to 2023 shows a significant gap in economic concentration. Based on the category, Cilegon City, Tangerang City, and Serang City exhibit perfect inequality values. This indicates that these areas have a large variety of economic potential, which may contribute to inequality with other regions. When viewed based on economic structure, the high development inequality is associated with regions that concentrate on modern economic structures, particularly in sectors experiencing rapid growth. In contrast, Lebak Regency, Pandeglang Regency, and Tangerang Regency display a more evenly distributed level of inequality. The presence of concentrated economic centers among underdeveloped regions illustrates this disparity. Figure 1 presents the distribution of the mean value of the Theil Index in Banten Province from 2013 to 2023.

Based on Table 2, the descriptive statistics for each variable over the 2013–2023 panel data period are as follows. The average value of the Intra Theil Entropy Index (DevInq) in Banten Province is 3.019, with the lowest recorded value of 0.239 in Lebak Regency in 2013 and the highest of 20.884 in Cilegon City in 2023. The standard deviation is 4.699. The average Human Development Index (HDI) is 70.876, with the lowest contribution from Lebak Regency in 2013 at 61.13 and the highest from South Tangerang City in 2023 at 82.28. The standard deviation is 6.019. The average labor force participation rate (Labor) is 61.976, with the lowest recorded in Cilegon City in 2016 at 24.686 and the highest in Lebak Regency in 2016 at 74.549. The standard deviation is 6.294. The average poverty rate (Pov) is 1.834, with the lowest found in Cilegon City in 2016 at 1.121 and the highest in Tangerang Regency in 2016 at 2.441. The standard deviation is 0.353.

The average value for the manufacturing sector (industry) under Sector C is 3.723. The lowest value was recorded in South Tangerang City in 2020 at -8.79, while the highest was in Pandeglang Regency in 2022 at 14.15. The standard deviation is 3.723. For Sector E, covering water, sewage, and waste management (Water), the average growth is 5.487, with the lowest value in Pandeglang Regency in 2022 at -1.1 and the highest in Serang Regency in 2013 at 11.77. The standard deviation is 2.652. Growth in Sector H, transportation and storage (transportation), averages 6.199. The lowest value was in Tangerang City in 2020 at -45.85, while the highest was also in Tangerang City in 2022 at 54.36. The standard deviation is 8.912. For Sector L, the real estate sector (real estate) has an average growth of 6.063. The lowest value was in Cilegon City in 2020 at 0.85, and the highest was in South Tangerang City in 2013 at 11.62. The standard deviation is 6.063. Lastly, the average economic growth (growth) in Banten Province is 4.738, with the lowest recorded in Tangerang City in 2020 at -7.363 and the highest in South Tangerang City at 8.755. The standard deviation is 2.587.

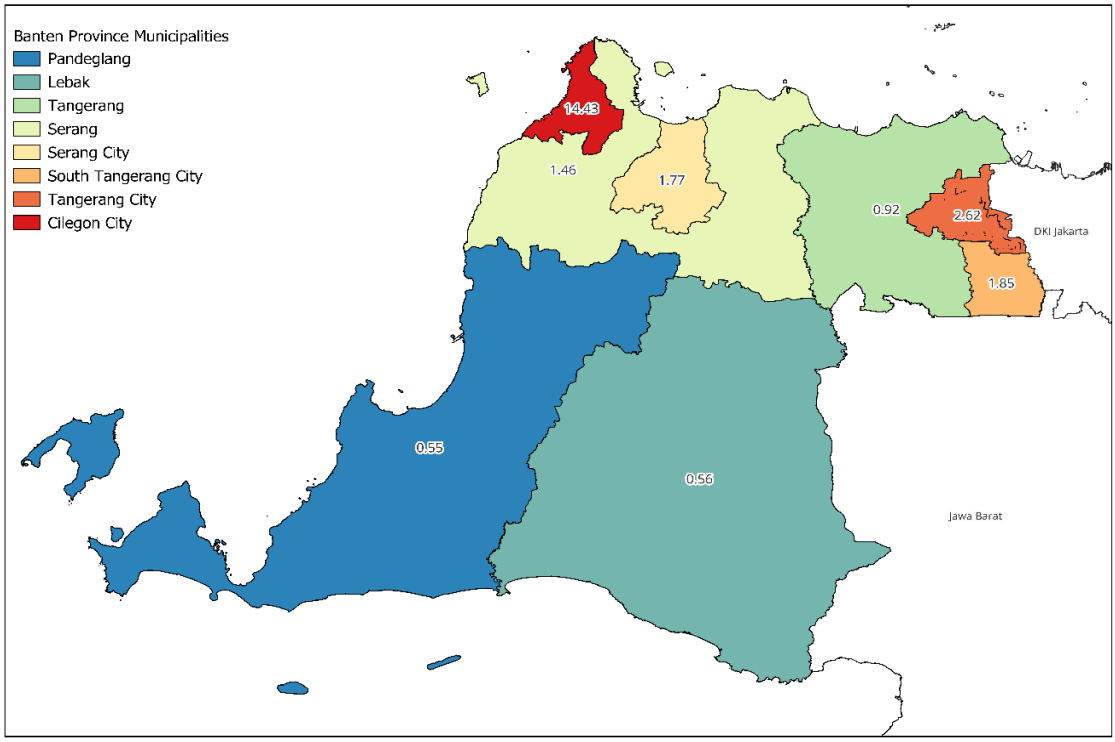

Figure 1. Mean of Theil Index of Banten Province 2013 – 2023

Table 1. Banten Province Intra-Theil Entropy Index from 2013 – 2023

Intra-Theil Entropy Index											
Regions	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Pandeglang Regency	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.9	0.9	0.9	1.0
Lebak Regency	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.8	0.9	0.9	1.4
Tangerang Regency	0.3	0.3	0.3	0.4	0.4	0.4	0.4	2.5	1.6	1.7	1.8
Serang Regency	0.8	0.9	0.9	1.0	1.1	1.1	1.2	2.2	2.2	2.3	2.4
Tangerang City	1.4	1.4	1.4	1.5	1.5	1.6	1.7	5.7	4.0	4.2	4.4
Cilegon City	10.2	10.5	10.8	11.2	11.7	12.3	12.9	18.7	19.4	20.1	20.9
Serang City	1.1	1.1	1.2	1.2	1.3	1.4	1.5	2.6	2.6	2.7	2.8
South Tangerang City	0.8	0.9	0.9	0.9	1.0	1.0	1.1	3.2	3.4	3.5	3.7

Table 2. Descriptive statistics

Variables	Minimum	Maximum	Std. deviation	Mean
DevInq	0.239	20.884	4.699	3.019
HDI	61.13	82.28	6.019	70.876
Labor	24.686	74.549	6.294	61.976
Pov	1.121	2.441	0.353	1.834
Industry	-8.79	14.15	3.601	3.723
Water	-1.1	11.77	2.652	5.487
Transportation	-45.85	54.36	8.912	6.199
RealEstate	0.85	11.62	2.576	6.063
Growth	-7.363	8.755	2.587	4.738

Source: Data Processed, 2024

Table 3. Spatial Matrix Weight

Summary of spatial weighting object W	
Matrix	**Description**
Dimensions	8 x 8
Stored as	8 x 8
Values	
min	0
min>0	0.0383237
mean	0.125
max	0.506493

Source: Data Processed, 2024

Table 3 presents the spatial weight matrix (W), which measures the distance and contiguity between regions, denoted by *Wij*. The matrix is an 8 x 8 structure that contains the coordinates of the cities and regencies within Banten Province. Spatial dependence is further illustrated in Table 4. As previously noted, the spatial dependence test is applied to determine whether the variables in the panel data exhibit regional interdependence. The results indicate that the panel data demonstrate spatial dependence, as shown by a p-value of less than 0.05.

Table 4. Pesaran's Spatial Dependence Test

Spatial Dependence Test	Pesaran's Test	Probability
Random Effect	2.489	0.0128
Fixed Effect	2.245	0.0248

Source: Data Processed, 2024

The estimation results in Table 5, based on the Spatial Durbin Model (SDM), consist of two coefficients: beta (β) and theta (θ). The beta coefficient represents the intercept, while the theta coefficient reflects the *Wx* notation, which captures the influence of explanatory variables from neighboring regions that share borders or corners.

Table 5. Spatial Durbin Model (SDM) results

Parameters	Coef.	Z value	P | z |
β_0	-50.18507	-2.89	0.004
β_1	-0.5233998	-1.66	0.098
β_2	0.072052	2.82	0.005
β_3	6.916445	-2.04	0.041
β_4	-0.0976419	-1.66	0.097
β_5	0.1145108	1.81	0.071
β_6	-0.0305073	-1.34	0.182
β_7	-0.0106222	-0.09	0.926
β_8	0.2873649	1.56	0.119
θ_1	1.043533	3.00	0.003
θ_2	-0.0552984	-0.97	0.332
θ_3	17.24104	1.88	0.060
θ_4	0.244355	2.18	0.030
θ_5	-0.1018563	-0.64	0.525

Parameters	Coef.	Z value	P|z|
θ_6	0.0931778	1.87	0.061
θ_7	-0.1418882	-0.61	0.542
θ_8	-0.7032995	-2.23	0.026
ρ	-0.5209255		

Source: Data Processed, 2024

$$\widehat{DevInq} = -0.5209255 \sum_{j=1}^{n} W_{ij}\, Y_j - 50.18507 - 0.5233998 HDI_i + 0.072052 Labor_i + 6.916445 Pov_i - 0.0976419 Industry_i + 0.1145108 Water_i - 0.0305073 Transportation_i - 0.0106222 RealEstate_i + 0.2873649 EcoGrowth_i + 1.043533 \sum_{j=1}^{n} W_{ij}\, HDI_j - 0.0552984 \sum_{j=1}^{n} W_{ij}\, Labor_j + 17.24104 \sum_{j=1}^{n} W_{ij}\, Pov_j + 0.244355 \sum_{j=1}^{n} W_{ij}\, Industry_j - 0.1018563 \sum_{j=1}^{n} W_{ij}\, Water_j + 0.0931778 \sum_{j=1}^{n} W_{ij}\, Transportation_j - 0.1418882 \sum_{j=1}^{n} W_{ij}\, RealEstate_j - 0.7032995 \sum_{j=1}^{n} W_{ij}\, Growth_j + \varepsilon_i \quad \text{.....(2)}$$

Based on the results of Equation 2, the spatial lag coefficient (ρ) indicates that development inequality in districts and cities of Banten Province decreases by 52 percent if a neighboring area (Yj), which directly intersects with the region (Yi), increases by one unit, *ceteris paribus*. The intercept value (α or β_0) suggests that development inequality decreases by 52 percent, assuming all other explanatory variables remain constant (*ceteris paribus*). An intercept of -50.18507 implies that development inequality would decrease by 50.18 when all variables are equal to 0 or constant.

The coefficient for the Human Development Index (βX_{1i}) indicates that an increase of one unit in HDI, *ceteris paribus*, directly reduces development inequality within the respective region (i). This is supported by data from Tangerang Regency and Tangerang City in 2020–2021, where HDI increased by 0.370 and 0.250, respectively, accompanied by a notable decrease in development inequality by 0.941 and 1.747. However, there is no evidence of a direct influence on other regions.

Assuming that all other factors remain constant, the Human Development Index (X_1) has a coefficient of -0.5233998 with a p-value of 0.098. This indicates that an increase of one index unit in the Human Development Index of a city or region is associated with a decrease in development inequality by approximately 0.523. However, the result is not statistically significant. In contrast, the coefficient value of θ_1 is 1.043533 with a p-value of 0.003, indicating a statistically significant positive relationship. Specifically, development inequality increases by 1.043 when the Human Development Index (X_1) of neighboring districts or cities increases by one index unit, holding other variables constant. This means that regional development inequality (Y_i) tends to increase indirectly when the Human Development Index (X_{1j}) in adjacent regencies or cities rises. This pattern is reflected in the observed increase in development inequality (Y_i) alongside the rising average Human Development Index values in neighboring areas, including Pandeglang Regency (adjacent to Lebak and Serang), Lebak Regency (adjacent to Pandeglang, Tangerang, and Serang), Tangerang Regency (adjacent to Lebak, Serang, Tangerang City, and South Tangerang City), Serang Regency (adjacent to Pandeglang, Lebak, Tangerang, Cilegon City, and Serang City), Tangerang City (adjacent to Tangerang Regency and South Tangerang City), Cilegon City (adjacent to Serang), Serang City (adjacent to Serang Regency and Cilegon City), and South Tangerang City (adjacent to Tangerang Regency and Tangerang City).

The increase in GDP per capita as an economic indicator often stems from improved

labor productivity, quality of life, and purchasing power. Regions with stronger development, such as Tangerang Regency and Tangerang City, tend to experience greater prosperity. In contrast, underdeveloped areas—especially those bordering more advanced regions—face growing challenges in narrowing the gap. As a result, regional disparities due to development inequality become increasingly evident.

The β2 coefficient is valued at 0.072052, with a p-value of 0.005 for the Labor Force Participation Rate (X2). This indicates that a one percentage point increase in the labor force participation rate within a district or city will significantly elevate development inequality in the area by 0.072, assuming other variables remain constant. The labor force participation rate coefficient (LABOR) (βX2i) shows that if the value increases by one percent and other variables are considered constant, then the development inequality in the regions will increase directly (*Yi*) and significantly. The phenomenon that supports this hypothesis gives a different shock in each place. The availability of labor without improving the quality and distribution of labor will worsen labor absorption in underdeveloped areas. As a result, more productive and trained regions will advance, while developed regions will lag relatively.

The coefficient value θ2 of -0.0552984 and a p-value of 0.332 indicate that Development Inequality will decrease by 0.0552984, albeit insignificantly, with a one percentage point increase in the labor force participation rate (X2) from adjacent districts/cities, assuming other variables remain constant. Meanwhile, the indirect influence described on the coefficient (*θX2j*) states that the inequality of development in the region (*Yi*) will decrease if the labor force participation rate in the region (*Xj*) increases by one percent and other variables are considered constant. However, although the annual variation varies from region to region, it can be considered that an increase in the availability of labor in a region indicates an increase in economic activity, which will increase people's purchasing power. In most cases, the labor available in disadvantaged areas will generally be absorbed into adjacent developed areas, improving the community's overall welfare. This condition will lower the difference between more developed and less developed regions. Increasing the workforce also means the effective use of existing human resources. It will increase productivity and economic efficiency, allowing economic development to run better and minimizing inequality.

The labor force participation rate (X2) has a θ2 coefficient value of -0.0552984, with a p-value of 0.332. It indicates that if X2 from neighboring districts/cities increases by one percentage unit and other variables remain constant, the development inequality will decrease by 0.0552984, but not significantly. The value of the coefficient θ3 is 17.24104, and the p-value of 0.60 means that the development inequality will not increase significantly by 17.24104 if the poverty percentage (X3) of neighboring districts/cities (areas in direct contact) increases by one unit of percentage and other variables are considered constant. The poverty percentage coefficient (βX3i) value explains that if the value increases by one percent and other variables are considered constant, it will increase development inequality directly and significantly in the region (*Yi*). This phenomenon can be evidenced by the Pandeglang Regency, Lebak Regency, and Serang Regency areas, where the increase significantly influences the annual development inequality in the percentage of poverty. In line with the direct influence, the increase in development inequality in the region (*Yi)* is also indirectly influenced by the increase in the percentage of poverty in other intersecting regions (*θX2j*). However, in 2021, Tangerang Regency and Tangerang City denied this phenomenon by decreasing the value of development inequality in the two regions. Because the two regions have the highest GDP per capita growth in the Banten province area, their economic activities can support inequality development in their regions. They are not affected by poverty in their regions or other regions.

The coefficient β4 value of -0.0976419, accompanied by a p-value of 0.097, indicates that a one percentage point increase in the growth rate of the manufacturing sector (X4) will decrease development inequality in the district or city by 6.916, albeit not significantly, assuming other variables remain constant. The value of the coefficient θ4 is 0.244355, and the p-value of 0.030 means that the development inequality will increase by 0.244355 significantly if the growth rate of the processing industry sector (X4) from neighboring districts/cities (areas in direct contact) increases by one unit percent and other variables are considered constant. The value of the coefficient of growth rate of the processing industry sector (βX4i) states that if the value increases by one unit percent and other variables are considered constant, it will directly reduce regional development inequality (*Yi*). Regions with economic activities can prove this with a processing industry-based sector, whose reduction in development inequality is directly influenced by the growth rate of the processing industry sector. However, the Tangerang district has a different phenomenon, namely, the influence is small. The Tangerang district has a more supportive base sector, such as construction, financial services, and insurance. While the indirect influence shows that development inequality in the region (*Yi*) will increase if the growth rate of the processing industry sector from the intersecting regions (*θX3j*) increases by one percent, this is because if the intersecting regions have a comparative advantage with the availability of resources that support the industrial sector, they will be more productive and increase inequality compared to the regions other. In the case of Pandeglang, Lebak, Tangerang, and Serang, development inequality will increase if the industrial sector in Serang and Cilegon City increases.

The value of the β5 Coefficient is 0.11451 with a p-value of 0.071 from the growth rate of the water, sewage and waste management sector (X5), meaning that if the growth rate of the waste, waste and recycling water procurement sector in a district/city increases by one unit of percent, it will increase the development inequality in the area by 0.1145 but not significantly, assuming the other variable its influence is considered constant. The value of the coefficient θ5 -0.1018563 and the p-value of 0.525 means that the development inequality will decrease by 0.101 not significantly if the growth rate of the water, waste, and sewage management (X_5) from neighboring districts/cities (areas in direct contact) increases by one unit of percentage, and other variables are considered constant. These results show that providing sanitation infrastructure in one of the regions can potentially increase inequality. It can be assumed that there is an economic agglomeration in an area where agglomeration, such as industry, water demand, waste generation, and waste disposal, will increase. Because of the increase in these things, the growth of the water, sewage, and waste management sector will also increase, increasing development inequality. Moreover, the water and waste management sector contributes more to the social aspect than to the economy.

The value of the β6 coefficient is 0.030507 with a p-value of 0.186 from the growth rate of the transportation and storage sector (X6), which means that if the growth rate of the transportation and warehousing sector in a district/city increases by one unit of percentage, it will reduce the development inequality in the area by 0.030 but not significantly, assuming that other variables have an effect that is considered constant. The value of the coefficient θ6 is 0.0931778, and the p-value of 0.061 means that the development inequality will increase by 0.0931778 not significantly if the growth rate of the transportation and storage sector (X6) from neighboring districts/cities (areas in direct contact) increases by one unit of percentage, and other variables are considered constant. The transportation and storage sector has a role in reducing development inequality in the distribution of goods or services and human movement, which plays a role in the equitable distribution of economic development. Likewise, regional inequality will increase when there is a decline in the transportation sector. For example, what happened in Pandeglang Regency

in 2020, when there was a decline in the transportation and storage sector (from 7.5% in 2019 to -3.29% in 2020), there was an increase in the IET figure from 0.4 to 0.89, which means that development inequality increased. As for when associated with interactions between regions, a significant increase in the transportation and storage sector in a region can be interpreted as evidence of an increase in economic activity so that when one region experiences an improvement in infrastructure quality, it can have the potential to increase development inequality in surrounding areas that are unable to keep up with the increase.

The value of the β7 coefficient is 0.010622 with a p-value of 0.926 from the growth rate of the real estate sector (X7), which means that if the growth rate of the real estate sector in a district/city increases by one unit of percentage, it will reduce the development inequality in the area by 0.0106 but not significantly, assuming that other variables have a constant effect. The value of the coefficient θ7 -0.1418882 and the p-value of 0.542 means that the development inequality will decrease by 0.1418882 not significantly if the growth rate of the real estate sector (X7) from neighboring districts/cities (areas in direct contact) increases by one unit percent, and other variables are considered constant. The real estate sector can be in the form of housing development or trade and services, where these developments can not only grow economic activities but also reduce development inequality between regions due to the existence of equity both in terms of housing provision, trade and service areas, and other developments in terms of real estate. The real estate sector tends to concentrate in urban areas or regions with high land value, such as the Tangerang Area (Tangerang City, Tangerang Regency, and South Tangerang City). The property activity is not distributed evenly, especially in regions with low economic development (like Pandeglang and Lebak). Therefore, real estate development does not significantly affect regional inequality, because the benefits are not evenly distributed throughout the province.

The value of the β8 coefficient is 0.2873649 with a p-value of 0.119 from economic growth (X8), which means that if economic growth in a district/city increases by one unit of percent, it will increase the development inequality in the area by 0.287 but not significantly, assuming that other variables have a constant effect. The value of the coefficient θ8 -0.7032995 and the p-value of 0.026 means that the development inequality will decrease by 0.7032995 significantly if the Economic Growth (X8) of neighboring districts/cities (areas directly tangent) increases by one percentage unit, and other variables are considered constant. On the one hand, economic growth can act as a wheel for the development of a region. On the other hand, centralized economic growth, as shown by the results of the analysis of economic structure, can also increase the inequality of development between regions, as shown by the rapid growth of economic sectors in Tangerang City, Cilegon City, and Serang City, based on the results of the analysis. The concentration of economic activities in these cities has increased the level of development inequality within Banten Province.

CONCLUSION

The study results also prove that the economic structure in areas with rapid development, such as Cilegon City, Tangerang City, and Serang City, is dominated by the concentration of modern economic sectors, where these sectors have rapid growth. Meanwhile, other regions, such as Lebak Regency, Pandeglang Regency, and Tangerang Regency, have a dominant economic sector structure with slow growth.

The regression results prove that there is no influence between HDI, TPAK, HCI-P0, and the contribution of the base sector (water, sewage and waste management sector, transportation and storage sector, and real estate sector) on the Intra-Theil Entropy Index spatially in regencies/cities in Banten Province. In addition, the regression results prove that some of the contributions of the base sector (the processing industry sector) influence economic growth.

However, it is not significant to the Intra-Theil Entropy Index spatially in regencies/cities in Banten Province. It can be interpreted that the two influential variables are not statistically strong enough to prove the existence of these influences, so further research is needed to deepen the data from the two variables.

In order to encourage the economy, regions that are more backward than areas with a high concentration of economic growth urgently need intervention from the government, both from the provincial and district/city levels, to focus on the base sectors in these regions. These interventions can be in the form of adequate infrastructure development to support these sectors, primarily related to the Processing Industry sector, where the results of spatial regression show an influence on development inequality. In addition, there needs to be efforts in the context of economic growth that can be associated with the processing industry sector because economic growth also statistically influences development inequality. Thus, the condition of inequality can be overcome.

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REFERENCES

Aritenang, A. F., & Chandramidi, A. N. (2022). The spatial effects of fiscal decentralization on regional convergence: the case of regions in Indonesia. *GeoJournal*, *88*(2), 2011–2030. https://doi.org/10.1007/s10708-022-10724-2

Belantika, B. T., Rohmad, B., Arandita, H. D. N., Hutasoit, D. R., & Kartiasih, F. (2023). Factors affecting poverty using a geographically weighted regression approach (case study of Java Island, 2020). *Optimum: Jurnal Ekonomi Dan Pembangunan*, *13*(2), 141–154. https://doi.org/10.12928/optimum.v13i2.7993

Carrera, E. J. S., Rombaldoni, R., & Pozzi, R. (2021). Socioeconomic inequalities in Europe. *Economic Analysis and Policy*, *71*, 307–320. https://doi.org/10.1016/j.eap.2021.05.007

Duana Ávila, D., & Hernández Gracia, T. J. (2021). Growth of the Manufacturing Industry in Mexico. *IBEROAMERICA*, *2*, 108. https://doi.org/10.37656/s20768400-2021-2-05

Fitriyah, N., Yuniarti, T., Wahyono, E., Prayoga, R. A., Fatriani, R. M., Wicaksono, A., Setram, N., Juniati, H., Wijaya, G., & Nuraini, L. (2024). Clean Water Issues, Community Behavior and Communication Models in Sustainable Development Goal 6 in Banten West Java Indonesia. *International Journal of Sustainable Development and Planning*, *19*(1), 247–258. https://doi.org/10.18280/ijsdp.190123

Gu, R., Li, C., Li, D., Yang, Y., & Gu, S. (2022). The Impact of Rationalization and Upgrading of Industrial Structure on Carbon Emissions in the Beijing-Tianjin-Hebei Urban Agglomeration. *International Journal of Environmental Research and Public Health*, *19*(13). https://doi.org/10.3390/ijerph19137997

Haemmerli, M., Powell-Jackson, T., Goodman, C., Thabrany, H., & Wiseman, V. (2021). Poor quality for the poor? A study of inequalities in service readiness and provider knowledge in Indonesian primary health care facilities. *International Journal for Equity in Health*, *20*(1), 239. https://doi.org/10.1186/s12939-021-01577-1

Hidayat, M., Bachtiar, N., Sjafrizal, S., & Primayesa, E. (2023). The Influence of Investment, Energy Infrastructure, and Human Capital Towards Convergence of Regional Disparities in Sumatra Island, Indonesia; Using Oil and Gas Data and Without Oil and Gas. *International Journal of Energy Economics and Policy*, *13*(4), 139–149. https://doi.org/10.32479/ijeep.14117

Huluka, A. T. (2024). How is the multidimensional poverty changing in Ethiopia? An empirical examination using demographic and health survey data. *Cogent Economics & Finance*, *12*(1). https://doi.org/10.1080/23322039.2024.2364359

Jagódka, M., & Snarska, M. (2023). Regional Disparities As A Result Of Differences In Human Capital And Innovativeness On The Example Of Poland. *Technological and Economic Development of Economy*, *29*(2), 696–716. https://doi.org/10.3846/tede.2023.18536

Koley, M., & Bera, A. K. (2024). To use, or not to use the spatial Durbin model? – that is the question. *Spatial Economic Analysis*, *19*(1), 30–56. https://doi.org/10.1080/17421772.2023.2256810

Lazăr, A., Eva, M., Bourdin, S., & Iaţu, C. (2021). A multi-criteria analysis of regional disparities in Romania (2000–2016). *Romanian Journal of Geography*, *65*(1), 21–34.

Miranti, R. C., & Mendez, C. (2023). Social and Economic Convergence Across Districts in Indonesia: A Spatial Econometric Approach. *Bulletin of Indonesian Economic Studies*, *59*(3), 421–445. https://doi.org/10.1080/00074918.2022.2071415

Nugroho, H. Y. S. H., Indrajaya, Y., Astana, S., Murniati, Suharti, S., Basuki. (2023). A Chronicle of Indonesia's Forest Management: A Long Step towards Environmental Sustainability and Community Welfare. *Land*, *12*(6), 1238. https://doi.org/10.3390/land12061238

Raharjo, S. N. I., & Pudjiastuti, T. N. (2024). Indonesia in the BIMP-EAGA: Assessing Connectivity Development in Reducing Inequality. *Suvannabhumi: Multidisciplinary Journal of Southeast Asian Studies*, *16*(1), 175–203. https://doi.org/10.22801/svn.2024.16.1.175

Solihin, A., Wardana, W. W., Fiddin, E., & Sukartini, N. M. (2021). Do government policies drive economic growth convergence? Evidence from East Java, Indonesia. *Cogent Economics & Finance*, *9*(1). https://doi.org/10.1080/23322039.2021.1992875

Sunoko, R., Saefuddin, A., Nanere, M., & Ratten, V. (2022). *Micro Small Medium Enterprises (MSMEs) and Indonesian National Economies During and Post COVID-19* (pp. 141–150). Springer. https://doi.org/10.1007/978-981-16-4795-6_13