

SHIFTING LANDSCAPES: THE IMPACT OF GLOBAL PANDEMIC ON REGIONAL DEVELOPMENT DISPARITIES AND FISCAL RESILIENCE

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Abstract

This study analyzes regional development disparities and fiscal resilience in West Java Province, Indonesia, from 2014 to 2024, specifically focusing on the disruptive impact of the COVID-19 pandemic. Using the Williamson Index and a decomposed Theil Index across four spatial lenses: metropolitan vs. non-metropolitan, north vs. south, development areas, and cities vs. regencies. The research evaluates inequality trends and their determinants through panel data regression (Random Effects Model) for the 2018–2024 period. Results reveal that regional inequality remains high, with the Williamson Index peaking at 0.710 during the pandemic in 2020 and stagnating thereafter. Theil Index decomposition shows that intra-regional (within-area) disparity is the primary contributor to total inequality. Regression analysis indicates that the Human Development Index (HDI) and Non-Physical Special Allocation Funds (DAK) significantly improve GRDP per capita, while population density and poverty rates act as structural barriers. A notable novelty is the identification of a "K-shaped" recovery and a labor market paradox where advanced regions experience jobless growth and educated unemployment. The study implies that West Java must reorient from growth-oriented to people-centered development, prioritizing equitable digital infrastructure and human capital to bridge the gap between industrial hubs and stagnant rural areas.

Keywords: COVID-19, Fiscal Resilience, Regional Disparity, Theil Index, West Java, Williamson Index.



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INTRODUCTION

The dynamics of regional economic development in Indonesia have undergone a profound transformation since the beginning of the “Big Bang Decentralization” era at the start of the millennium. This policy aims to bring public services closer to the community and reduce entrenched regional disparities from the centralized New Order era. (Hill & Vidyattama, 2016). However, along the way, decentralization has often given rise to new challenges, including economic fragmentation and governance inequalities, resulting in wider variations in regional growth. West Java Province, as one of the engines of national economic growth and the province with the largest population, is a highly relevant case for observing this phenomenon, especially in the context of massive external pressures such as the COVID-19 pandemic (Ramadhan et al., 2024).

The COVID-19 pandemic is a global external shock that has had a profound impact on social and economic systems in various countries. Early studies indicate that this pandemic is not only a health crisis but also an economic crisis, testing the resilience of regional systems worldwide (Lavopa & Donnelly, 2023). This is particularly evident in the differences in economic performance between regions, which reflect development disparities that existed long before the pandemic occurred.

Income and development inequality is not merely a matter of statistical distribution, but rather reflects differences in access to infrastructure, education, and health care, which fundamentally determine the quality of life of the community (Syaifudin et al, 2025). Theoretically, the neoclassical hypothesis states that, in the early stages of development, inequality tends to increase before reaching a turning point and beginning to decline (convergence) (Ramadhan et al., 2024). However, empirical evidence from many developing countries, including Indonesia, shows that economic interactions between regions often reinforce inequality through the backwash effect, whereby capital and skilled labor are absorbed into growth centers, leaving peripheral regions further behind (Hidayat et al., 2023).

West Java Province is one of the largest provinces in Indonesia, contributing significantly to the Indonesian economy and having a large population. According to BPS 2025, the percentage of the West Java Province's population in 2024 is 17.88%, the highest among other provinces. Additionally, with a population density of 1,359 inhabitants per square kilometre in 2024, West Java Province ranks second in terms of population density in Indonesia.

When viewed in terms of the distribution of GRDP among Indonesia's 34 provinces (Figure 1), West Java Province is one of the three provinces with the most considerable GRDP contribution compared to other provinces in the country. This shows that West Java Province is one of the important and influential provinces in the Indonesian economy.

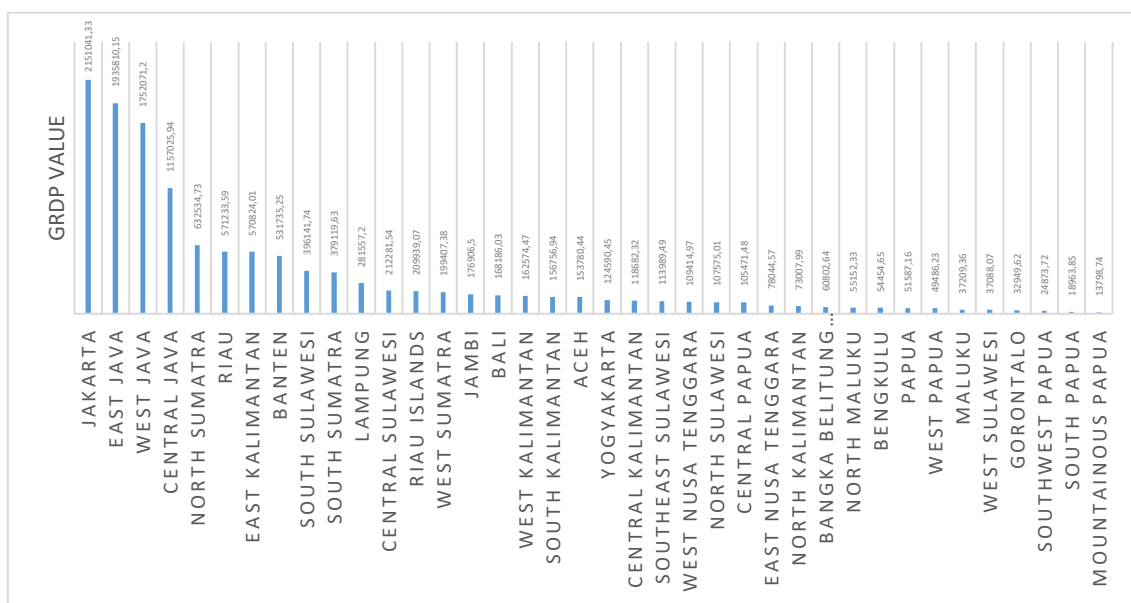


Figure 1. GRDP of 38 provinces based on constant prices (billion rupiah), 2024 (Source: BPS, 2025)

The high potential of West Java Province, in terms of economy, population, and regional fiscal and financial strength, does not necessarily guarantee economic equality and development in every district/city. Nasution (2020) explains that West Java Province is included in quadrant 2 of Klassen's typology, which compares the average economic growth and average GRDP per capita of all provinces in Indonesia during 2010-2019. Quadrant 2 means that economic growth in West Java Province is in the high category, but its GRDP per capita is below average. This is reinforced by Syaifudin et al. (2022), who explain that the development gap between districts/cities in West Java Province was relatively high from 2016 to 2020. Then, based on the results of the Klassen typology, which was carried out by comparing the per capita GRDP and economic growth rates of districts/cities, it is shown that most districts/cities in West Java Province are included in the developing region group.

Looking more specifically at the economic strength of West Java Province, it is evident that there is still an economic gap between the 27 districts/cities in West Java Province in terms of GRDP distribution. This is due to differences in development focus and economic activity among the various

districts and cities in West Java Province. This is illustrated in Figure 2, which displays the GRDP per capita of regencies/cities in West Java Province for 2024. From this data, it can be seen that Bekasi Regency, Karawang Regency, and Bandung City are the three regions with the highest GRDP per capita in West Java Province. Additionally, the southern part of West Java tends to have a lower GDP per capita than the northern part of West Java.

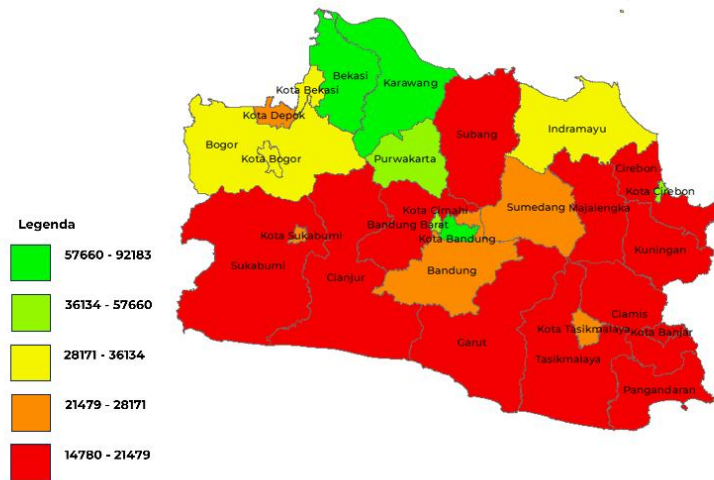


Figure 2. Distribution of GRDP per capita by district/city in West Java Province 2024 (Source: BPS, 2025)

In addition to examining per capita GRDP, which reveals disparities in development and economic performance between districts/cities in West Java Province, regional development disparities can also be observed through several indicators. Figure 3 shows that the highest HDI is still concentrated in large cities, such as Bandung, Depok, Bekasi, and Bogor. Meanwhile, the southern part of West Java tends to have a much lower HDI value compared to the northern part of West Java. Then, regency-based areas tend to have a lower HDI value compared to urban-based areas. This suggests that, in terms of human resource development, there is also an inequality in development between urban-based regencies/cities and those dominated by rural areas.

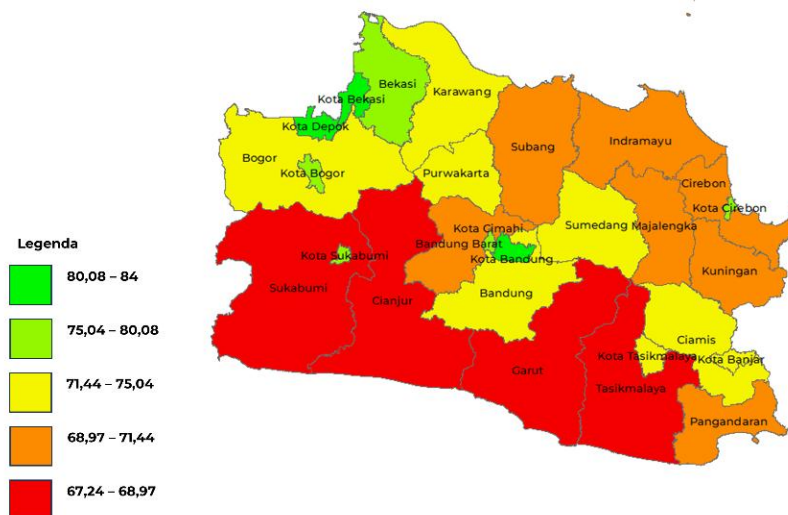


Figure 3. Human Development Index (HDI) by district/city in West Java Province 2024 (Source: BPS, 2025)

From the various data described in the background, it can be seen that in West Java Province, there are disparities between districts/cities in various aspects, ranging from economic development and fiscal capacity to human resource development and population distribution. These disparities are further reflected in economic responses and recoveries across regions, with some regions showing high resilience

to the pandemic shock. In contrast, others lag far behind in their recovery. The term regional economic resilience often describes a region's ability to withstand and recover from shocks, such as pandemics. It is measured by indicators that account for economic growth, sector structure, and the resilience of local economic systems (Turgel & Chernova, 2024).

Then, if we analyze the budget proportions in the 2023 Provincial/Regency/City Budget (APBD) in more detail, we can see that revenue and expenditure from transfer revenue and transfer expenditure are substantial. This is shown in Figures 4 and 5, which present the structure of the provincial/regency/city APBD in percentages. Figure 4 shows that regencies/cities in West Java Province tend to depend on transfer income. The province also has a significant share of transfer income, although regional income sourced from Regional Original Income (PAD) remains greater. Figure 5 shows that transfer expenditure is around 38-40 percent for provincial governments. This value is quite significant and the second-largest expenditure after operating expenditure. In district/city governments, transfer expenditure accounts for around 11 percent and ranks third, after operating and capital expenditure. Figures 4 and 5 show that dependence on transfer funds creates a flypaper effect, whereby local governments tend to be more responsive in allocating transfer funds to public expenditure than in allocating local revenue (PAD). In line with Asmarawati and Randos (2025), these signs indicate that increased transfers are not always effective in promoting fiscal independence, as regional spending is more driven by "money from outside" than by internal capabilities.

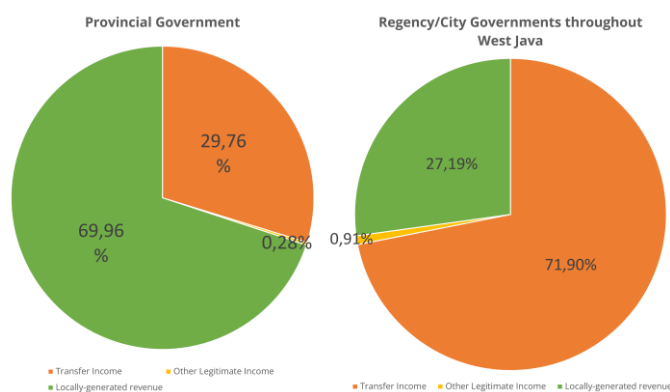


Figure 4. Regional Revenue Structure in the 2023 Provincial/District/City Regional Budget (Source: BPS, 2023)

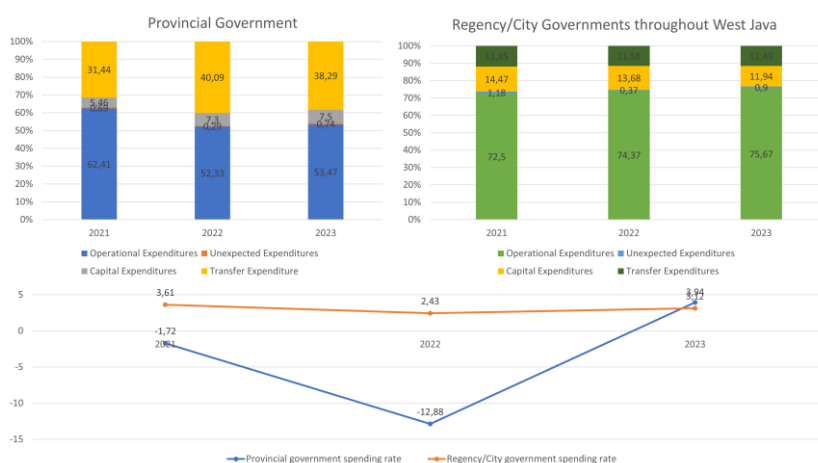


Figure 5. Regional Expenditure Structure in the 2021-2023 Provincial/District/City Regional Budgets (Source: BPS, 2023)

Patarai (2017) explains that in Indonesia, fiscal decentralization itself was developed in "Efficient Allocation of National Resources through transparent and accountable central financial relations" through:

- a. Central and regional financial relations that minimize inequality;
- b. Regional revenue and financing systems for efficient allocation;

- c. Regional spending flexibility to achieve Minimum Service Standards; and
- d. Harmonization of central and regional spending for public services.

The context of the COVID-19 pandemic has broadened the focus of research on regional economic resilience, encompassing resistance to initial shocks and the ability to recover after them. Regional economic resilience encompasses economic structure, fiscal capacity, and institutional factors that influence a region's response to global crises (Zhang & Tian, 2024). The research by Zhang and Tian (2024) emphasizes that the pandemic 'has underscored the importance of a region's capacity to withstand and adapt to external shocks' to maintain sustainable development.

In addition, spatial heterogeneity in economic resilience is a critical concern. Empirical studies show that "the impact of the pandemic on regional economic dynamics is not the same in every region, with significant variations related to structural factors and local resources" (Brata et al., 2025). This shows that regional disparities have become more pronounced during the pandemic, making a one-size-fits-all policy less effective in addressing the impact of inequality (Brata et al., 2025). These changes are also evident in regional development patterns. Economic sectors that were previously strong did not necessarily show the same resilience in the face of the pandemic. In contrast, regions with more diversified economic structures tended to recover more quickly. These differences indirectly highlight how the structure and dynamics of local economies prior to the pandemic shaped the speed and direction of post-crisis recovery (Zhang & Tian, 2024).

This phenomenon not only affects economic output, such as GRDP (Gross Regional Domestic Product), but also affects the fiscal resilience of local governments. For example, research in Indonesia shows that the pandemic has had a significant impact on revenue from the taxation and retribution sectors in many provinces, with implications for local fiscal capacity to support development programs (Syamsul et al., 2022). These fiscal consequences are not only temporary. Other studies indicate that increased fiscal pressure can pose long-term risks to fiscal sustainability, such as rising debt-to-income ratios and widening budget deficits, which ultimately could hamper the government's capacity to support post-pandemic development (Wibowo, 2023). In the context of public policy responses, fiscal stimulus packages are considered crucial tools for strengthening economic resilience and accelerating recovery. Research in South Asian countries confirms that strong fiscal stimulus and monetary policy are necessary to rebuild a stronger economy after the global pandemic shock, especially in severely affected regions (Ahmad & Alam, 2024).

This policy response has important implications for regional development equity. Regions with greater fiscal capacity tend to implement more effective stimulus policies, while regions with more vulnerable finances struggle to make significant interventions. This has the potential to widen regional development disparities in the post-pandemic period. Furthermore, post-pandemic economic recovery in many regions is uneven. Several empirical studies have shown that regions with strong fiscal capacity and more diverse economic structures achieve better recovery rates, reinforcing the point that fiscal resilience is an important factor in shaping post-pandemic regional economic resilience (Sugihartini & Hendrian, 2025). Although many studies have been conducted on development inequality in West Java Province, several fundamental research gaps remain that this study seeks to address. First, most of the previous literature tends to analyze inequality in general, without specifically examining the effects of extreme external disruptions such as the COVID-19 pandemic on patterns of inequality at the district/city level in the most recent time frame (2018-2024). Second, the regional comparative approach has limitations. At the same time, other studies often examine inter-regional inequality in isolation. This study offers a comprehensive comparative analysis through four lenses simultaneously: the Metropolitan vs. Non-Metropolitan dichotomy, North vs. South disparities, grouping by Development Areas (WP), and differences in characteristics between Regencies and Cities. Third, in terms of determinants, this study integrates fiscal variables (budget and transfer funds) with structural indicators (economic strength, infrastructure, and human development) into a single analytical model. Thus, this study not only captures inequality figures but also examines how spatial dynamics and fiscal policies interact to create development polarization in West Java in the post-pandemic era. Based on the background described above, the research questions in this study are as follows:

1. What are the conditions of regional disparities in West Java Province?
2. What factors influence regional development disparities in West Java Province?

RESEARCH METHOD

This study employs three primary analytical tools to measure the level of inequality between districts/cities and the factors that influence it in West Java Province: the Williamson index, the Theil index, and panel data regression analysis. The two indices are applied simultaneously because they have complementary characteristics. The Williamson index serves to calculate the overall level of regional inequality (disparities between regions). In contrast, the Theil index provides a more in-depth analysis by separating total inequality into two components, namely between regions and within regions. The two indices were calculated for several periods from 2014 to 2024 to trace the dynamics of changes in regional inequality levels in West Java Province over time, particularly to compare conditions before and after the Covid-19 pandemic. Panel data regression analysis was employed to identify the variables that significantly influenced development inequality between districts/cities in West Java Province from 2018 to 2024. Details regarding the types and sources of data that will be used can be seen in Table 1.

Table 1. Data Types and Sources

No	Research Purposes	Data Type	Data Source	Method	Output
1.	Analyzing the conditions of inequality between regions in West Java Province	Regency/City GRDP Number of residents of the regency/city	BPS	Williamson Index and Theil Index	Knowing the level of inequality between regions in West Java Province
2.	Analyzing the factors that influence inter-regional inequality in West Java Province	<ul style="list-style-type: none"> • GRDP Per Capita • HDI • Financial Transfers and Village Funds • Employment Rate • Foreign investment • Domestic Investment 	<ul style="list-style-type: none"> • BPS • Open Data West Jawa • Indonesian Ministry of Finance 	Panel Data Regression	To find out what factors significantly influence inequality between regions in West Java province.

Williamson Index, with GRDP per capita as the basic data. This is because the index compares the level of development among regions, not the level of income distribution among social groups (BPS 2022). The Williamson Index represents the relationship between regional disparity and economic level, using data from already developed and developing economies. The calculation is based on the regional per capita income and the population of each regency/city. The statistical formula for the Williamson Index is as follows Equation 1.

$$IW = \frac{\sqrt{\sum_i^n (y_i - y)^2 \frac{n_i}{n}}}{y} \times 100 \quad (1)$$

Notes:

- IW = Williamson Index
- y_i = GRDP per capita in regency/city i
- y = Average GRDP per capita in West Java Province
- n_i = Population in regency/city i
- n = Population in West Java Province

The classification of disparity levels can be seen in Table 1.

Table 2. The classification of disparity levels

Index	Level of disparity
> 1	Very High
0.7 – 1	High
0.4 – 0.69	Medium
< 0.4	Low

In addition to measuring the level of disparity among regencies/cities, it is also important to look at the development of these areas in West Java Province. To get a clearer picture of the real conditions of inter-regional disparity and development, the Theil Index is used. This method has the advantage of being able to decompose disparity into two components: within-region and between-region disparity. The principle of the Theil Index is that the more diverse the activities or the wider the spatial reach, the higher the regional entropy. The value of regional entropy can serve as a benchmark for how developed the regencies/cities in West Java Province are. The Theil Index can also reveal which regions cause the disparity and which are affected by it.

The formula for the Theil Index is as follows Equation 2

$$I_{Theil} = \sum \left(\frac{y_j}{Y} \right) \cdot \log \left[\left(\frac{y_j}{Y} \right) / \left(\frac{x_j}{X} \right) \right] \quad (2)$$

Where:

- I_{Theil} = Total disparity in regencies/cities in West Java Province (Theil Index)
- y_j = Total GRDP in the j-th regency/city
- Y = Total GRDP in West Java Province
- x_j = Population in the j-th regency/city (persons)
- X = Total population in West Java Province (persons)

According to Bourguignon (1979), Cowell (1980), and Shorrocks (1980), as cited in Kranzinger (2020), the Theil Index can be decomposed into several groups using the following Equation 3

$$T(1) = \underbrace{\sum_{k=1}^K s_k \times T(1)_k}_{\text{within component}} + \underbrace{\sum_{k=1}^K s_k \ln \left(\frac{\mu_k}{\mu} \right)}_{\text{between component}} \quad (3)$$

Where:

- $T(1)$ = Theil Index
- K = Total population of the subgroup
- s_k = Proportion of the total GRDP in subgroup k
- $T(1)_k$ = Theil Index of subgroup k
- μ = Average GRDP
- μ_k = Average GRDP of subgroup k

The first term in the above equation describes the within-component, the weighted sum of the subgroup Theil Index ($T(1)_k$). The second term describes the inequality arising from differences between subgroups, which depends on the variation in average income levels (μ_k). To weigh the contribution of each subgroup, the total income share (s_k) is used, representing its economic weight in the total population (Kranzinger 2020).

The analysis of inequality using the Theil index in this study was conducted to compare four criteria, namely: 1) Inequality between metropolitan and non-metropolitan areas; 2) Inequality between northern West Java and southern West Java; 3) Inequality between Development Areas (WP); and 4) Inequality between cities and regencies.

Inequality between metropolitan and non-metropolitan areas. The following is a map showing the distribution of districts/cities that are included in metropolitan and non-metropolitan areas (Figure 6).

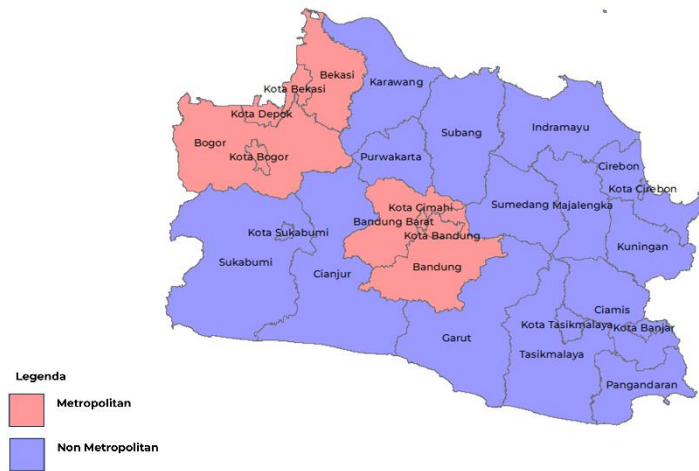


Figure 6. Regional Expenditure Structure in the 2021-2023 Provincial/District/City Regional Budgets

Inequality between northern West Java and southern West Java. The following is a map showing the distribution of districts/cities that are included in northern West Java and southern West Java areas (Figure 7).

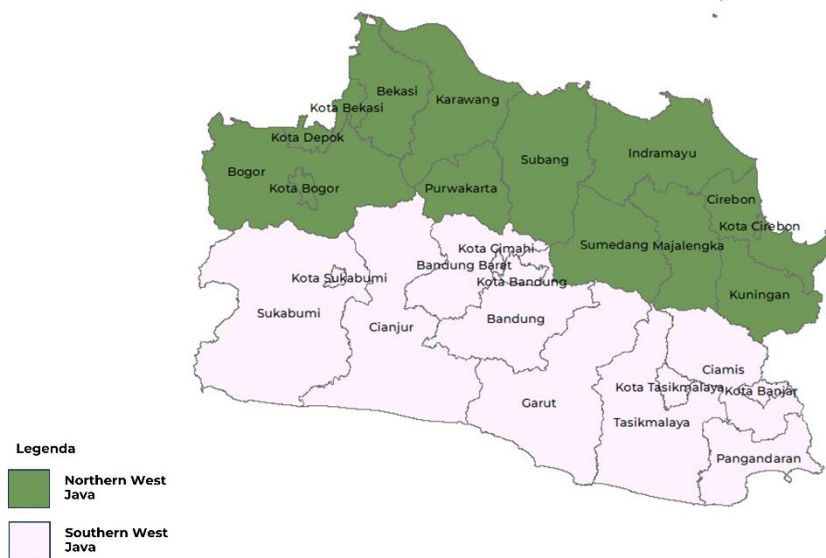


Figure 7. Division of regencies/cities in West Java Province based on northern West Java and southern West Java

Inequality between Development Areas (WP). The following is a map showing the distribution of districts/cities that are included in Development Areas (Figure 8).

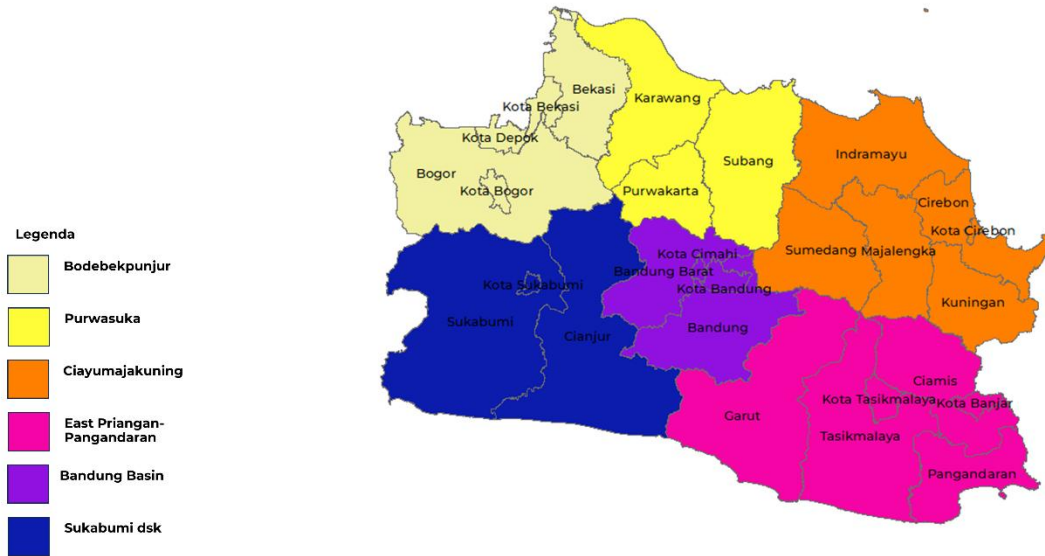


Figure 8. Division of regencies/cities in West Java Province based on Development Areas

Inequality between cities and regencies. The following is a map showing the distribution of districts/cities with city and regency status (Figure 9).

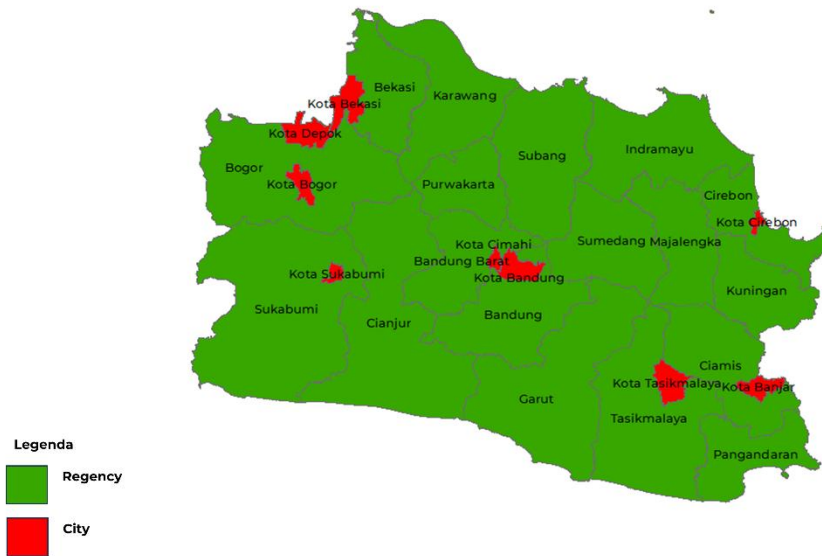


Figure 9. Division of regencies/cities in West Java Province based on cities and regencies status

An analysis to examine the factors influencing regional inequality in West Java using panel data regression. Panel data is a combination of cross-sectional data and time series data, resulting in more observations than either cross-sectional or time series data alone. This study employs one dependent variable and several independent variables to examine their impact on the dependent variable. These variables are presented in Table 3.

Table 3. Operational definition of variables

Variabel/Symbol	Variable Measurement	Unit	Resources
Dependent Variabel			
Gross Regional Domestic Product	The logarithm of the GRDP value of each district/city in West Java Province divided by its population in 2018-2024	Rupiah	Badan Pusat Statistik

Variabel/Symbol	Variable Measurement	Unit	Resources
(GRDP) per capita (LPDRBK)	Independent Variabel		
Population (LPPDK)	Logarithm of the population of each district/city in West Java Province from 2018 to 2024	People	Badan Pusat Statistik
Total Regional Investment Value per Capita (LINVESTK)	Total logarithm of regional investment value originating from domestic and foreign investment in each district/city in West Java Province with population figures from 2018 to 2024	Rupiah	Open Data Jawa Barat
Per capita spending (LBK)	Logarithm of capital expenditure in the regional budget of each district/city in West Java Province with population figures for 2018-2024	Rupiah	Ministry of Finance and Badan Pusat Statistik
General Allocation Fund (DAU) per Capita (LDAUK)	Logarithm of DAU values for each district/city in West Java Province with population figures for 2018-2024	Rupiah	Ministry of Finance and Badan Pusat Statistik
Physical Special Allocation Fund per Capita (LDAKFK)	The logarithm of Physical Special Allocation Fund (Physical DAK) values for each district and city in West Java Province and the population size from 2018 to 2024.	Rupiah	Ministry of Finance and Badan Pusat Statistik
Non-Physical Special Allocation Fund per Capita (LDAKNFK)	The logarithm of Non-Physical Special Allocation Fund (Non-Physical DAK) values for each district and city in West Java Province and the population size from 2018 to 2024.	Rupiah	Ministry of Finance and Badan Pusat Statistik
Human Development Index (IPM)	Human Development Index (HDI) values for each district/city in West Java Province from 2018 to 2024	Index	Badan Pusat Statistik
Poverty Rate (KEMISKINAN)	Percentage of poor population in each district/city in West Java Province from 2018 to 2024	Percent	Badan Pusat Statistik
Open Unemployment Rate (TPT)	Percentage of the unemployed labor force relative to the total labor force in each district/city in West Java Province for the period 2018-2024	Percent	Badan Pusat Statistik
Regional Development Index (IPD)	Regional infrastructure development index in each district/city in West Java Province from 2018 to 2024	Index	Badan Pusat Statistik (diolah)
Economic Growth Rate (LPE)	Percentage change in GRDP value for each district/city in West Java Province from 2018 to 2024	Percent	Badan Pusat Statistik
Fiscal Independence (KF)	Ratio of Local Own-Source Revenue (PAD) to total Local Revenue for each district/city in West Java Province from 2018 to 2024	Percent	Ministry of Finance
Dummy before and after the Covid-19 pandemic (K)	Dummy explaining the years before the Covid-19 pandemic (2018-2019) and after the Covid-19 pandemic (2020-2024)	Index	-

The model used is as follows:

$$LPDRBK_{it} = \alpha + \alpha_1 LPPDK_{it} + \alpha_2 LINVEST_{it} + \alpha_3 LBK_{it} + \alpha_4 LDAUK_{it} + \alpha_5 LDAKK_{it} + \alpha_6 IPM_{it} + \alpha_7 KEMISKINAN_{it} + \alpha_8 TPT_{it} + \alpha_9 IPD_{it} + \alpha_{10} LPE_{it} + \alpha_{11} KF_{it} + \alpha_{12} K_{it} + \mu_{it}$$

Description:

α = coefficient

μ = error

$i = 1, 2, \dots, 27$ regencies and cities in West Java

$t = 2018, 2019, \dots, 2022$

RESULTS AND DISCUSSION

Conditions of Development Disparities Between Districts/Cities in West Java Province

This study will examine the conditions of inequality between districts/cities in West Java Province. These conditions of inequality will be examined using the Williamson Index to see the general conditions of inequality between districts/cities in West Java Province. In addition to the Williamson Index, the Theil Index will also be used as a comparison to examine inequality between districts/cities in West Java Province, as well as inequality between districts/cities based on the classification described in the previous chapter on methodology.

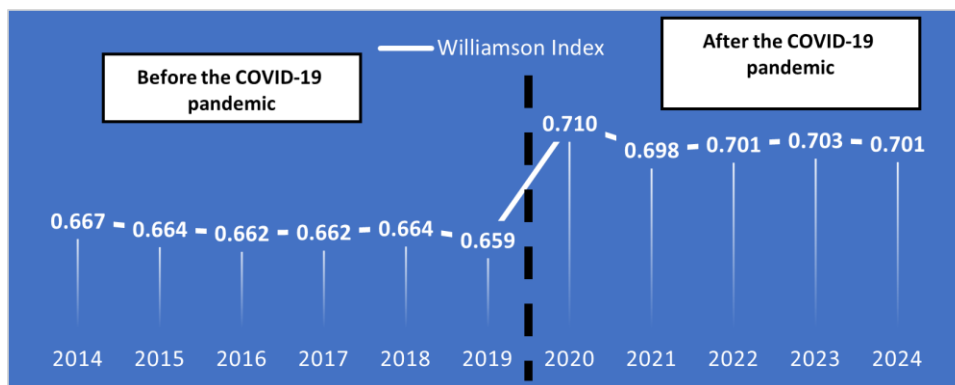


Figure 10. Williamson Index in West Java Province 2014-2024

Figure 10 illustrates the development of regional inequality in West Java Province using the Williamson Index. In West Java Province, the Williamson Index declined annually from 2012 to 2019. In the period before the COVID-19 pandemic, the graph shows that the West Java Williamson Index stood at 0.664 in 2018 and declined slightly to 0.659 in 2019. Despite a slight decline of 0.005 points, the index still far exceeded the moderate inequality category. This indicates that the economic structure of West Java in the pre-pandemic period was heavily influenced by the dominance of capital-intensive manufacturing industries in certain areas (Syaifudin et al, 2022). The slight decline in 2019 reflects decentralization efforts that have begun to spread to buffer zones. However, this “progress” remains marginal because significant investments remain focused on Bekasi and Karawang regencies, which are centers of automotive and electronics manufacturing in Southeast Asia. (Siswantoro, 2023).

Although classical theory states that developed regions should experience a decline in inequality during a crisis, evidence shows that pandemics can widen disparities. When a pandemic occurs, regions that were previously stronger (i.e., large export industries, high international openness) experience a relatively greater shock due to the fall in global demand, thereby hampering regional output and widening disparities. Variations in economic structure and the ability to flexibly integrate in response to shocks explain this asymmetric resilience (Sutton et al, 2023).

The surge to 0.710 in 2020 supports the argument that the pandemic has widened the geographic gap between the “rich” and the “poor”. Highly populated urban areas became the epicenter of virus spread, triggering a massive shutdown of economic activity and resulting in mass layoffs (Bappeda Provinsi Jawa Barat, 2022). From a humanitarian perspective, 2020 was a year in which social vulnerability in West Java reached a critical point, reflected in a significant increase in the number of people living in extreme poverty compared to pre-pandemic conditions (Rahayu et al, 2021).

After reaching its peak in 2020, the graph shows a moderating trend in the following years, although the index remains at a very high level relative to the ideal equity standard. In 2021, the

Williamson Index fell to 0.698, reflecting the early stages of recovery in which strategic sectors began to adapt to the new normal.

However, this downward trend did not continue consistently to pre-pandemic levels. Data from 2022 to 2024 shows a tendency toward stagnation at high levels: 0.701 (2022), 0.703 (2023), and back to 0.701 (2024). This phenomenon is referred to as “inequality hysteresis,” where major shocks (such as a pandemic) leave a permanent impact on the regional economic structure (Akida & Alisjahbana, 2023). It is concentrated in sectors that were already strong, such as manufacturing and information and communication.

Disparities between metropolitan and non-metropolitan areas

Based on Table 4 and Figure 11, which presents development in West Java for the period 2014–2024, it can be seen that development inequality between regions has undergone significant changes over the past decade. In general, the Theil index is used to measure the level of development inequality, where a smaller value means that development is more evenly distributed. In the pre-pandemic era (2014-2019), West Java showed a relatively stable inequality trend with a slight downward trend in the Between Area component, from 0.0084 to 0.0070. This phenomenon indicates a slow convergence in average income, in line with the expansion of strategic infrastructure that began connecting growth centers with peripheral areas (Silviana & Tallo, 2020). However, economic growth averaging above 5% is still dominated by industrial agglomeration in metropolitan areas, which theoretically creates a spillover effect but has not been able to eliminate the dominance of internal regional inequality (Within Area), which accounts for around 90% of the total provincial disparity (Hidayadi & Niam, 2022).

Table 4. Theil Index decomposition values between metropolitan and non-metropolitan areas in West Java Province 2014-2024

Disparity/ Area	Theil Index										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Between Area	0.008	0.008	0.007	0.007	0.007	0.007	0.006	0.014	0.014	0.014	0.014
	4	2	8	6	4	0	2	6	8	5	8
Within the Area	0.070	0.072	0.072	0.071	0.071	0.070	0.068	0.071	0.071	0.071	0.071
	7	5	0	7	7	5	6	9	8	8	3
Metropolitan	0.035	0.038	0.038	0.038	0.039	0.039	0.038	0.039	0.039	0.039	0.039
an	0	6	5	9	3	0	4	6	3	3	3
Non-Metropolitan	0.035	0.033	0.033	0.032	0.032	0.031	0.030	0.032	0.032	0.032	0.032
an	7	9	5	8	4	5	2	3	5	6	0
Total Disparity	0.079	0.080	0.079	0.079	0.079	0.077	0.074	0.086	0.086	0.086	0.086
	1	7	9	3	1	6	8	5	6	3	0

Supporting arguments during this period show that even though the gap between clusters has narrowed, the welfare gap between districts/cities within the same cluster remains wide. For example, there is a very striking gap in per capita GRDP, with Bandung City reaching IDR 116 million while Cianjur Regency is only at IDR 19 million (Paramaditya et al, 2024). Saepullah et al (2025) say that this condition reflects what is known as the backwash effect, where productive metropolitan areas suck up capital and human resources from surrounding areas, creating exclusive and less inclusive growth for people in non-metropolitan rural areas. Siswanto (2024) found in his research that road infrastructure availability is a dominant factor in reducing income inequality in West Java, compared to education or health facilities. This increased accessibility triggers a spread effect, allowing non-metropolitan areas to become integrated into the regional supply chain, though, in human terms, the welfare gap between individuals in remote areas remains evident.

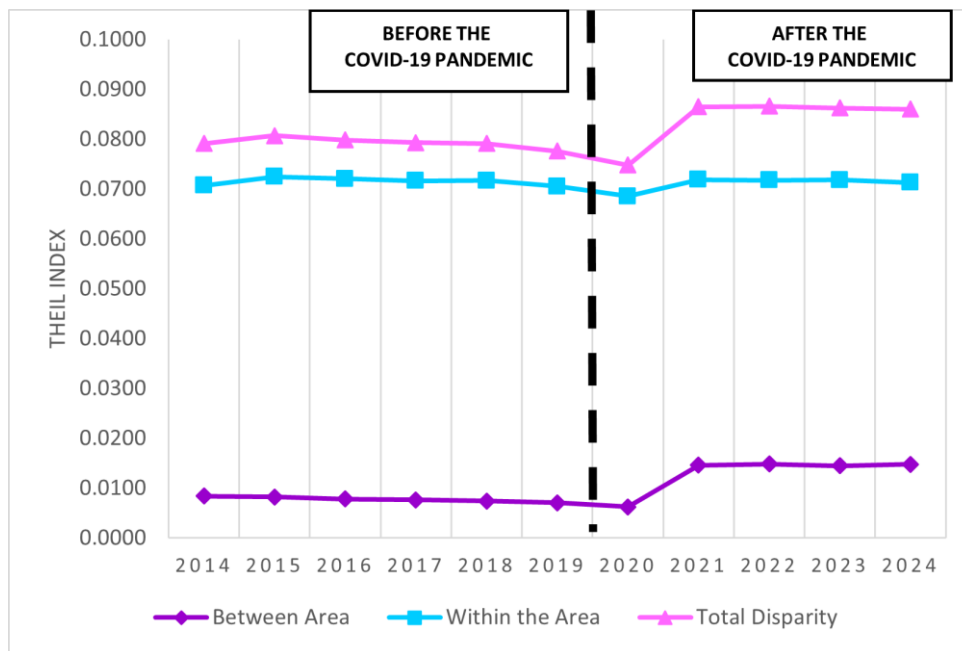


Figure 9. Theil Index Value Trends between metropolitan and non-metropolitan areas in West Java Province 2014-2024

Entering 2020, the COVID-19 pandemic triggered a drastic decline in the Total Disparity figure, which reached a low of 0.0748. However, this decline should not be interpreted as the success of equity policies, but rather as "negative convergence" or equity in economic contraction. Manufacturing- and service-based metropolitan areas experienced a much deeper decline than agricultural non-metropolitan areas. From a humanistic perspective, the pandemic period showed that urban growth centers were actually the most vulnerable to health and economic crises. Santoso et al. (2022) stated in their study that "urban areas, with better economic conditions... had a higher number of confirmed cases" (p. 299). This has placed a heavy economic burden on urban residents who have lost their jobs in the formal sector. At the same time, non-metropolitan areas have shown greater resilience due to their low dependence on interregional mobility and global supply chains (Saputri & Arif, 2023).

Post-pandemic (2021-2024), data shows a sharp spike in inequality, with the Between Area component more than doubling to 0.0148. This phenomenon demonstrates the existence of a K-shaped economic recovery, in which metropolitan areas with stronger digital infrastructure and human capital recover more quickly through the reactivation of manufacturing and the digital economy (Lito et al., 2025). Conversely, non-metropolitan areas lag in the recovery race due to limited access to new technologies and investments, which structurally widens the income gap between regions (Akita & Alisjahbana, 2023).

The argument supporting this post-pandemic surge is closely related to the digital divide and the unpreparedness of social infrastructure in disadvantaged areas. As stated by Pramaditya et al. (2024), high income inequality can lead to unequal access to health and education services, thereby perpetuating the cycle of intergenerational poverty. The concentrated development of digital infrastructure in metropolitan core areas further exacerbates the economic isolation of peripheral areas that lack reliable broadband access (Lito et al, 2025).

Disparity between northern West Java and southern West Java

Based on Table 5 and Figure 10, it can be seen that inequality within regions is the primary source of total disparity compared to inter-regional disparity. The value of inter-regional inequality is relatively small and stable, at around 0.004–0.006, while inequality within regions is significantly greater, at around 0.072–0.081. This indicates that development gaps in West Java are more prevalent within the region itself (e.g., between core cities and buffer areas) than between the northern and southern regions of the province.

Table 5. Theil Index decomposition values between northern West Java and southern West Java areas in West Java Province 2014-2024

Disparit y/ Area	Theil Index										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Between	0.006	0.005	0.005	0.004	0.004	0.003	0.002	0.006	0.006	0.006	0.006
Area	3	8	0	5	0	3	8	0	0	0	0
Within	0.072	0.074	0.074	0.074	0.075	0.074	0.072	0.080	0.080	0.080	0.080
the Area	8	9	8	8	2	3	0	5	6	2	1
Northern											
West	0.043	0.045	0.044	0.043	0.042	0.040	0.038	0.045	0.044	0.044	0.043
Java	5	1	0	0	5	6	6	3	3	1	9
Southern											
West	0.029	0.029	0.030	0.031	0.032	0.033	0.033	0.035	0.036	0.036	0.036
Java	3	8	8	8	7	7	4	2	3	1	2
Total											
Disparit	0.079	0.080	0.079	0.079	0.079	0.077	0.074	0.086	0.086	0.086	0.086
y	1	7	9	3	1	6	8	5	6	3	0

Historically, development disparities in West Java Province have reflected a sharp spatial dichotomy between the industrialized northern region and the agrarian southern region. Prior to the COVID-19 pandemic (2014-2019), the Theil Index data showed a slow convergence trend, with the Between Area index consistently declining from 0.0063 to 0.0033. Although the average distance between the North and South narrowed slightly, disparities within regions (Within the Area) continued to dominate the total disparity. This condition indicates that the benefits of massive infrastructure development during that era were not fully distributed inclusively to the lower classes in each district/city.

Entering 2020, there was a statistical anomaly in which the total disparity reached its lowest point of 0.0748. However, this decline was not interpreted as a success in equalization, but rather as the impact of a universal crisis that paralyzed the main growth engine in the North. As empirical studies show, the pandemic caused a severe economic contraction, especially in the manufacturing and service sectors, thereby seemingly "bringing closer" the income levels of developed and underdeveloped regions through the phenomenon of shared poverty. This aligns with Harjanti et al. (2022), who found that declines in the performance of key sectors such as trade and corporate services drove the surge in inequality in 2020.

Post-pandemic (2021-2024), West Java faces a K-shaped recovery, with total disparity rising sharply to 0.0865. Data shows that the Between Area index has doubled to 0.0060, indicating that the North, with its technological base, has recovered more quickly than the South, which is still struggling. Methodologically, intra-regional inequality has proven to be the dominant factor in the structure of disparity in West Java, where economic concentration in growth centers such as Karawang and Bekasi has widened the income gap with surrounding regions.

Supporting arguments show that the growth of Regional Gross Domestic Product (RGDP) in West Java is often paradoxical. Mahadi et al. (2022) found a strong spatial correlation in which economic growth in one region often does not trickle down to neighboring regions (spillover effect), but instead sucks resources from surrounding regions (backwash effect). This is reinforced by Siswanto's (2024) finding that a 1% increase in per capita GRDP in West Java risks increasing inequality by 0.060%, as this growth is concentrated in capital-intensive sectors in the capital's buffer zone.

On the other hand, the labor force plays a crucial role in determining inequality. Saputri and Arif (2023) state that "income inequality will decrease by 0.025% if the labor force grows by 1%," which emphasizes the importance of absorbing skilled labor to balance income distribution. However, significant challenges remain in the southern region, which consistently lags due to limited access and mobility for goods, despite its abundant natural and maritime resources.

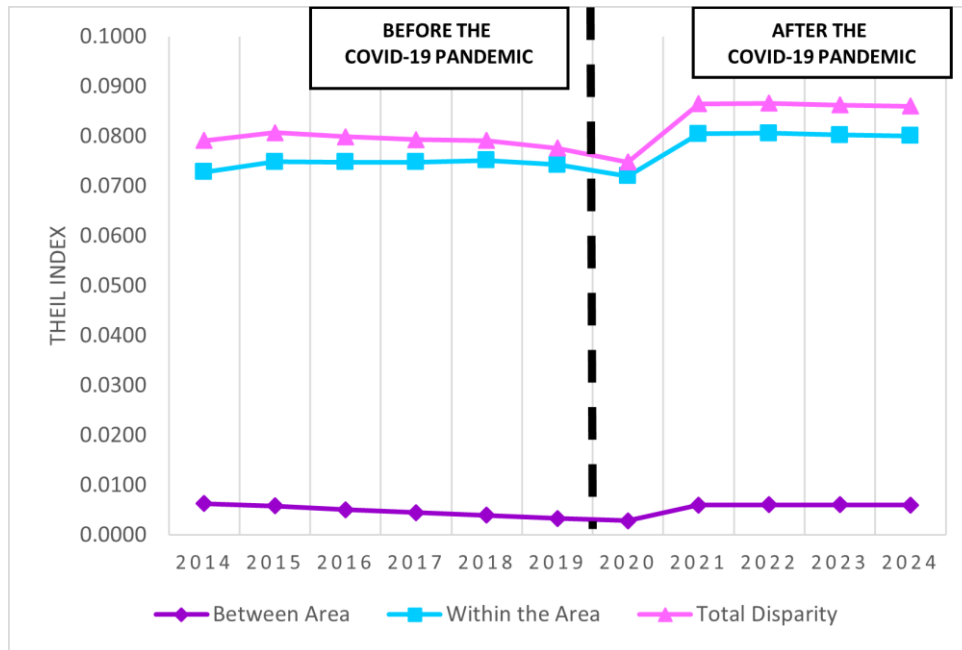


Figure 10. Theil Index Value Trends between northern West Java and southern West Java areas in West Java Province 2014-2024

Physical connectivity through road infrastructure has proven to be the most effective policy instrument in mitigating regional disparities. Siswantoro (2024) revealed crucial findings in his research: *“Every 1% increase in road development can reduce the Gini ratio by 0.042% in the long term through improved inter-regional connectivity and business productivity.”* This is a strong argument for the urgency of accelerating development in South West Java to reestablish economic connectivity, a significant challenge for equitable development.

Humanistically speaking, these statistics reflect the real struggles of West Javanese people in achieving prosperity. Inequality is not just numbers on paper; it reflects the differences in access to opportunities between communities in the remote South and the industrial center in the north. As emphasized by Wahyudi Ritonga (2023), development in the southern region is expected to drive overall productivity so that economic growth no longer depends solely on the industrial sector in the northern region.

Disparities between Development Regions

Based on Table 6, Figure 11, and Figure 12, it can be seen that inequality within development areas (intra-regional) is the main contributor to total disparity compared to inequality between development areas (inter-regional).

Table 6. Theil Index decomposition values between northern West Java and southern West Java areas in West Java Province 2014-2024

Disparity/ Area	Theil Index											
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Between Area	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	
Within the Area	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Bodebekpunjur	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	
Purwasuka	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Ciayumajakuning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Disparity/ Area	Theil Index										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
East Priangan- Pangandaran The Bandung Basin Special Region	0.00 03	0.00 04	0.00 05	0.00 05	0.00 05	0.00 05	0.00 05	0.00 04	0.00 05	0.00 05	0.00 05
Sukabumi Dsk	0.01 53	0.01 63	0.01 72	0.01 80	0.01 87	0.01 95	0.01 98	0.01 91	0.01 95	0.01 96	0.01 96
Total Disparity	0.00 05	0.00 05	0.00 05	0.00 05	0.00 05	0.00 04	0.00 04	0.00 04	0.00 04	0.00 04	0.00 04
	0.07 91	0.08 07	0.07 99	0.07 93	0.07 91	0.07 76	0.07 48	0.08 65	0.08 66	0.08 63	0.08 60

Development inequality in West Java Province is a persistent structural challenge, reflecting the dichotomy between modern industrial centers and underdeveloped rural areas. Spatially, economic activity is concentrated in the Bodebekpunjur Development Area (WP) and the Bandung Basin Special Area, which account for up to 60 percent of the Gross Regional Domestic Product (GRDP). This phenomenon is not merely a statistical figure, but rather a representation of unequal access to fundamental rights and social justice for millions of residents across the region. Rahayu et al. (2021) assert that “this inequality is influenced, among other things, by growth center policies, which select cities as areas to be supported as growth centers”.

During the pre-pandemic period (2014-2019), the structure of inequality in West Java remained stable but remained high. Based on the data in Table 6 (Figure 11), the Between Area component (inter-regional inequality) remained relatively stable at 0.025-0.028. In contrast, Within Area (inequality within regions) continued to dominate the total disparity, accounting for 0.052. The dominance of the manufacturing sector in the northern corridor has created a strong economic agglomeration. However, it often neglects connectivity in southern West Java, which relies on the primary sector and tourism. This shows that economic growth has not optimally distributed income to peripheral regions.

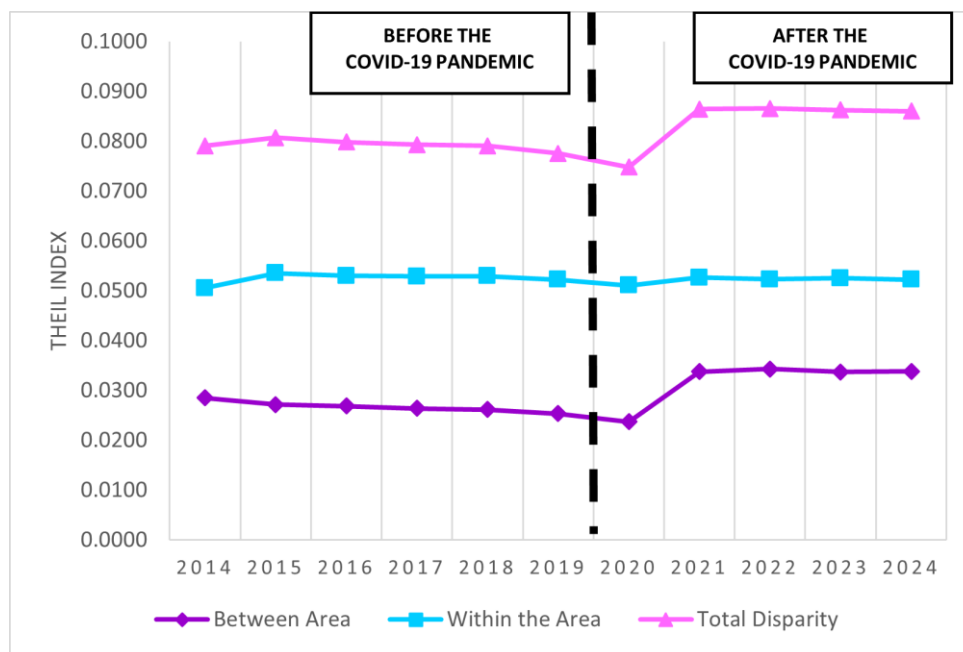


Figure 11. Theil Index Value Trends with development region criteria in West Java Province 2014-2024

The shock of the COVID-19 pandemic in 2020 caused a sharp economic contraction in West Java, reaching -2.52 percent. However, the interpretation of the Theil Index data for that year shows a false decline (anomaly), with total disparity falling to 0.0748. This decline occurred because industrialized regions were much more severely affected by mobility restrictions than agricultural regions. Sociologically, this condition is referred to as "poverty equalization," in which the income gap narrows

not because of improved welfare in disadvantaged regions, but because of economic collapse in growth centers.

Entering the post-pandemic recovery phase (2021-2024), there was a significant surge in inequality, marked by a rise in total disparity to 0.0865 in 2021. This sharp jump was triggered by the Between Area component, which jumped from 0.0237 to 0.0338, an increase of 42.6 percent in one year. This K-shaped recovery shows that industrial regions recovered more quickly through technological adaptation and government stimulus. In contrast, rural regions dependent on the informal sector remained trapped in economic stagnation.

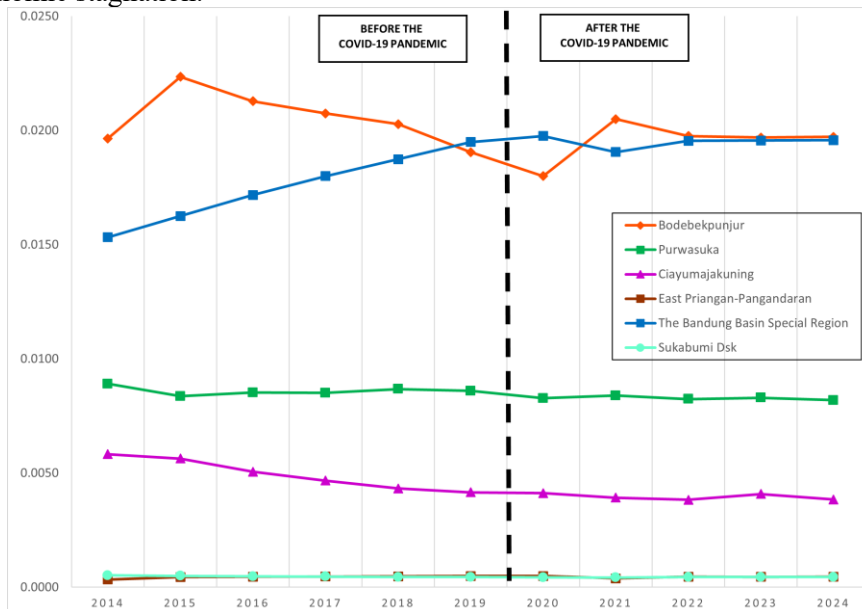


Figure 12. Theil Index Value Trends between development region in West Java Province 2014-2024

The main determinants driving this disparity include differences in infrastructure quality, access to education, and minimum wages. Saputri and Arif (2023) argue that economic expansion has a significant impact on income inequality, as an increase in the labor force that is not matched by job availability can exacerbate social inequality. The uneven quality of human capital also makes it difficult for workers in disadvantaged regions to participate in the post-pandemic digital economic transformation.

From a humanistic perspective, widespread inequality risks eroding social cohesion and increasing communities' vulnerability to future crises. Economic inequality is not only a matter of material distribution, but also an inequality of opportunity that limits human dignity. As stated in sociopolitical literature, "economic inequality also increases political inequality because wealthy groups are able to use their wealth to change rules that benefit them at the expense of the rights of many people." Therefore, development in West Java must be immediately reoriented from simply pursuing growth targets (growth-oriented) to people-centered development (people-oriented).

Disparities between cities and regencies

Based on Table 7 and Figure 13, the main factor driving inequality in West Java remains dominated by within-group inequality, especially at the district level. Brata et al. (2025) confirm that inequality between districts (regencies/cities) within a province is the most significant contributor to national disparities, surpassing the impact of inter-provincial inequality. In West Java, the value of internal district inequality (0.051–0.065) is far more significant than inequality between cities, reflecting the economic dualism between industrial and agricultural areas.

The administrative division between cities and regencies in West Java is not merely a bureaucratic label, but a reflection of very different economic structures. Cities in West Java generally have lower levels of internal inequality (0.015-0.020) than regencies. This indicates that cities such as Bandung, Bekasi, Depok, and Bogor are relatively uniform in terms of infrastructure development and service access, although the dominance of large cities such as Bandung remains significant compared to smaller cities such as Banjar or Cimahi (Sitepu, 2025).

In contrast, the regency group showed a substantial contribution to inequality, ranging from 0.051 to 0.065. Extreme geographical and industrial disparities can explain this phenomenon. On the one hand,

districts in the northern region, such as Bekasi, Karawang, and Purwakarta, have transformed into global manufacturing centers and are integral to the Pantura toll road system (Octifanny & Hudalah, 2017). These districts enjoy massive foreign direct investment (FDI) and have a GRDP per capita that far exceeds the provincial average.

On the other hand, districts in the southern region, such as Garut, Ciamis, Tasikmalaya, and Pangandaran, are still heavily dependent on agriculture, plantations, and traditional tourism. The infrastructure gap between the northern corridor, which is connected to the Jakarta-Bandung megaregion, and the southern region, which is relatively isolated logistically, is a significant factor driving the high Theil Index in this group of districts.

Table 7. Theil Index decomposition values between cities and regencies areas in West Java Province 2014-2024

Disparity/Area	Theil Index											
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Between Area	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.005	0.005	0.005	0.005	
	2	3	5	6	8	0	9	2	7	6	7	
Within the Area	0.076	0.078	0.077	0.076	0.076	0.074	0.071	0.081	0.080	0.080	0.080	
	9	4	4	6	4	6	9	3	9	7	4	
Cities	0.015	0.015	0.017	0.018	0.019	0.020	0.020	0.015	0.016	0.016	0.016	
	2	9	0	1	1	2	7	8	1	0	0	
Regencies	0.061	0.062	0.060	0.058	0.057	0.054	0.051	0.065	0.064	0.064	0.064	
	7	5	4	6	3	4	1	4	8	7	4	
Total Disparity	0.079	0.080	0.079	0.079	0.079	0.077	0.074	0.086	0.086	0.086	0.086	
	1	7	9	3	1	6	8	5	6	3	0	

The main factor driving inequality in West Java remains dominated by within-group inequality, especially at the district level. Brata et al. (2025) confirm that inequality between districts (regencies/cities) within a province is the most significant contributor to national disparities, surpassing the impact of inter-provincial inequality. In West Java, the value of internal district inequality (0.051–0.065) is far more significant than inequality between cities, reflecting the economic dualism between industrial and agricultural areas.

The COVID-19 pandemic shock in 2020 reversed this positive trend, triggering a surge in the Theil Index back to 0.086 in the 2021–2024 period. The most striking phenomenon was the widening gap between areas with "City" and "Regency" status, where the inter-group Theil Index value nearly doubled from 0.0030 (2019) to 0.0057 (2024). This indicates a process of spatial divergence, in which urban growth centers respond to crises more resiliently than regencies.

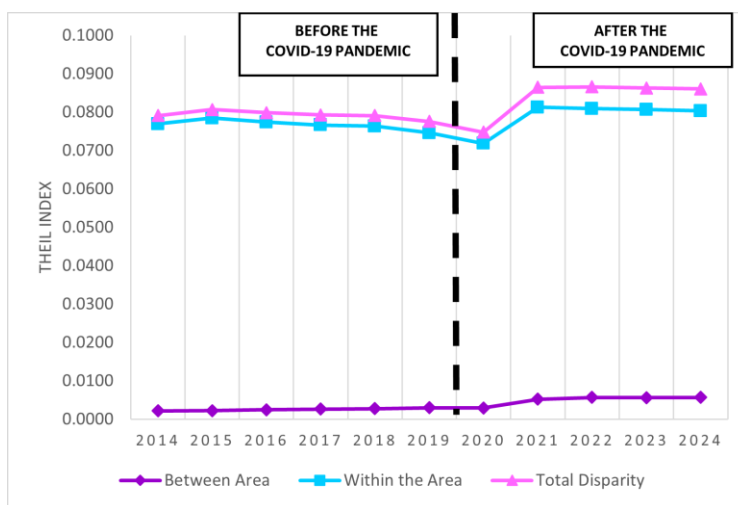


Figure 13. Theil Index Value Trends between cities and regencies in West Java Province 2014-2024

The argument supporting this recovery imbalance is closely related to the heterogeneity of regional economic resilience. Brata et al. (2025) argue that the pandemic did not fundamentally reduce disparities, but rather enabled regions with locational advantages and digital infrastructure to recover more quickly. Urban areas in West Java, which are concentrated in modern services and the information and communication sector, showed greater resilience than southern regions that depend on traditional tourism and the primary sector.

From a fiscal perspective, the pandemic led to a drastic decline in local governments' cash positions in West Java in 2021 due to unmet revenue targets. Randos and Suciwati (2026) reported significant "fiscal stress," with many districts experiencing declines in liquidity ratios below the operational threshold of 100%. The inability of regions to maintain sufficient cash reserves limits the policy space to fund capital spending to spur economic recovery effectively.

This fluctuating financial performance is also influenced by adaptive leadership capacity in managing succession and bureaucratic turbulence. For example, Bekasi City successfully transformed itself into the wealthiest city in West Java, with GRDP reaching Rp279 trillion in 2024, surpassing Bandung City, thanks to the optimization of the industrial and trade sectors despite leadership shocks during the pandemic (Marzuki & Suciwati, 2025). Santoso and Samputra (2024) emphasize that investment in technology and human capital is key to improving regions' positions in the economic resilience index in the post-pandemic era.

Vebiani et al. (2022) found significant differences in the ratio of financial effectiveness and efficiency in West Java between the pre-pandemic and pandemic periods. Although fiscal independence in several regions appeared stable, the decline in capital expenditure effectiveness highlighted obstacles to transforming financial resources into tangible development outcomes during difficult times. This reinforces the view that regional resilience is highly dependent on institutional capacity to manage budgets adaptively.

Panel Data Regression Analysis

The analysis of factors affecting development inequality among districts and cities in West Java is of critical importance, as this region exhibits significant variations in economic achievement and welfare. As a development indicator, economic growth reflects the extent to which economic activities can generate increased public income within a specific timeframe. This measure is typically assessed through the growth of Gross Domestic Product (GDP) per capita. A higher GDP per capita indicates that the level of community welfare is also improving (Todaro and Smith, 2012). Research results are presented in the form of graphs, tables, or descriptive. Analysis and interpretation of these results is necessary before they are discussed.

The Panel Data used in this study consists of 27 districts/cities in West Java Province over a 7-year period from 2018 to 2024. This analysis evaluates the relationship between transfer funds (DAU and DAK), fiscal independence, poverty levels, unemployment rates, economic growth rates, regional spending, HDI (IPM), City/Regency Development Index (IPD), investment, and population size toward development inequality among districts and cities in West Java by observing GRDP per capita and the Theil Index decomposition values for each district/city.

The Chow test and Hausman test were conducted to estimate the optimal model for this research. As shown in Table 8, the Chow test yielded a probability value of 0.0000, which is smaller than the 5% significance level; thus, it can be concluded that the Fixed Effects Model (FEM) is superior to the Pooled Least Squares (PLS) model. Subsequently, the Hausman test resulted in a probability value of 0.3899. The study concludes that there is sufficient evidence to use the Random Effects Model (REM), as it was determined to be the most suitable model among the alternatives and was therefore employed for the final analysis.

Table 8. Results of the best model selection test

Best Model Test	Probability	Decision
Chow Test	0.0000	FEM
Hausman Test	0.3899	REM

Based on Cross-sectional Dependence testing using the Pesaran method, a statistical value of 2.093 was obtained with a significance value (Prob) of 0.0363. Using a 95 percent confidence level, the

results show that the p-value is smaller than the significance level, so the null hypothesis (H_0) stating that there is no cross-unit dependence is rejected.

This indicates that there is a problem of cross-sectional dependence in the research data. In essence, these results show that there is a correlation or interdependence between the 27 regencies/cities in West Java that were observed. This phenomenon is common in regional data, where economic shocks or policy changes in one region tend to have a spillover effect on neighboring regions. The absolute average value of the off-diagonal elements of 0.538 reinforces the finding of a fairly strong correlation between units.

The most crucial challenge in regional panel data in Java is cross-sectional dependence (CSD) (Hadaina et al, 2025). CSD occurs when disturbances in one district correlate with disturbances in other districts during the same period. In West Java Province, CSD is triggered by three main factors:

1. Spatial Externalities and Spillovers: Economic growth in core areas such as Bandung City or the Jakarta metropolitan area (Jabodetabek) has a direct impact on surrounding satellite areas through the flow of goods, services, and capital (Hadaina et al, 2025).
2. Common Shocks: All 27 districts/cities in West Java were exposed to the same shocks, such as fluctuations in the rupiah exchange rate, changes in national energy prices, and most significantly, the COVID-19 pandemic in the 2020-2022 period (Auntu & Pilinkienė, 2026).
3. Regional Policy Integration: The West Java provincial government's policies on toll road infrastructure development (such as the Cisumdawu Toll Road) or the setting of minimum wage standards have created very close interregional linkages (Karim et al, 2020).

This CSD problem will be addressed using the Driscoll-Kraay Standard Errors. Driscoll and Kraay in Millo (2017) proposed a method for estimating the covariance matrix that is consistent with heteroscedasticity, autocorrelation, and cross-section correlation commonly found in panel data. This estimator is an extension of the Newey-West (1987) estimator, adapted to panel data. The Driscoll-Kraay estimator has a significant comparative advantage for the research object of 27 districts/cities in West Java ($N=27$) with a period of 7 years ($T=7$), because this non-parametric technique does not impose restrictions on the number of panel units and remains stable in samples with short time dimensions (Tran Phu Do et al, 2026).

The final model has a Within R-squared value of 0.8201, which indicates a very strong model power. The results of the model estimation of development inequality between districts/cities in West Java using REM are shown in Table 9. The R-squared (within) value obtained is 0.8431. This means that approximately 84.31% of the variation in per capita GRDP is obtained with an R-squared (within) value of 0.8454. This shows that approximately 84.54% of the variation in per capita GRDP over time in each district/city in West Java can be explained by the independent variables in the model, while the rest is explained by other factors outside the model. The Prob > F value of 0.0000 indicates that the model is statistically significant overall. Partially, the regression results show that there are three variables that are significant at a 5% confidence level, namely LPPDK (log population), LDKNFK (Non-Physical Special Allocation Fund), KEMISKINAN (Poverty Rate), TPT (Open Unemployment Rate), and IPM (Human Development Index).

Table 9. Estimation Results of the Development Inequality Model Among Districts and Cities in West Java Province

Variable	Koefisien	Std. Error	z-stat	P-Value
LPPDK	-0.2602459	0.0504433	-5.16	0.000*
LINVESTK	0.0005200	0.0025536	0.20	0.839
LDKFK	0.0112560	0.0060102	1.87	0.061***
LDKNFK	0.0318530	0.0103300	3.08	0.002*
LBK	0.0051902	0.0091983	0.56	0.573
LDAUK	-0.0337099	0.0250017	-1.35	0.178
IPM	0.0557419	0.0091615	6.08	0.000*
KEMISKINAN	-0.0293371	0.0120166	-2.44	0.015**
PT	0.0078499	0.0037441	2.10	0.036**
IPD	0.0008637	0.0016757	0.52	0.606
LPE	0.0007124	0.0017721	0.40	0.688

KF	0.1086245	0.0766658	1.42	0.157
K	0.0104810	0.0266955	0.39	0.695
Konstanta	9.7935860	1.0876910	9.00	0.000*

Notes: *($\alpha=1\%$), **($\alpha=5\%$), ***($\alpha=10\%$)

Analysis of Factors Affecting Regional Inequality in West Java Province

The Human Development Index (IPM) is proven to have a positive and highly significant influence on GRDP per capita with a coefficient of 0.0557 at a 1% significance level. This finding strongly confirms the Human Capital Theory developed by Schultz and Becker, which postulates that education and health are fundamental investments that directly increase the capacity, efficiency, and productivity of labor (Ramadhani et al, 2025). Improvements in human capital quality, as reflected in the HDI, contribute significantly to economic growth, because communities with better education and health are able to contribute more to innovation and productivity (Utami, 2020). In the context of West Java's economy, which relies on the industrial and service sectors, labor with good levels of health and education, as represented by the components forming the HDI, possesses a much higher adaptability to technological change. Investment in educational infrastructure and health quality will create human resources ready for entrepreneurship or to meet modern industrial qualifications (Argawandani and Imaningsih, 2025). Regions with high HDI consistently show high GRDP per capita because their workforce is able to produce greater value added for the economy compared to regions with a workforce whose health and education quality is still low.

A striking difference is seen in the impact of the Special Allocation Fund (DAK); Non-Physical DAK has a very significant positive influence (coefficient 0.0319, p-value 0.002), while Physical DAK significance is much weaker (coefficient 0.0113, p-value 0.061). This dominance of Non-Physical DAK is caused by the nature of its allocation, which directly touches the pulse of basic services, such as School Operational Assistance (BOS), Health Operational Assistance (BOK), and teacher professional allowances. This flow of operational funds has a very fast economic transmission (immediate impact) in maintaining community purchasing power at the local level and ensuring that health and education services do not stop. Conversely, an excessively large portion of spending on Physical DAK sometimes reflects allocation inefficiency, where infrastructure investment is not necessarily directed toward programs that have the fastest impact on the community's health or education output (Rahmi and Zulkifli, 2025). Unlike Physical DAK, which often has long-term impacts that are not immediately apparent, Non-Physical DAK has been shown to have a stronger positive correlation with improvements in the quality of life of communities in the short term (Arrosyid & Bawono, 2025).

The Log of Total Population variable shows a very significant negative influence (-0.2602) on per capita welfare. This reflects the working of the Malthusian Trap in the West Java region. Based on Mankiw's view of Malthusian theory in modern economics, population growth that is not balanced by adequate capital accumulation will cause capital dilution, where the portion of capital per worker becomes smaller. Java Island, particularly West Java, has a very high population density. Rapid population increase, without being accompanied by proportional job creation, will only increase the denominator burden in the calculation of GRDP per capita. Furthermore, this pressures public service capacity, triggers negative externality costs such as congestion, and ultimately lowers the average standard of living of the community in the area. Hidayat et al (2021) emphasize that population growth that is not accompanied by an increase in the availability of productive jobs and the quality of human resources tends to slow economic growth and deepen poverty levels.

One of the most interesting yet counterintuitive findings in this study is that the Open Unemployment Rate (TPT) has a positive and significant influence on GRDP per capita (coefficient 0.0078, p-value 0.036). According to classical theory, unemployment should decrease welfare, but the reality in West Java shows the opposite. This phenomenon can be dissected through three main structural explanations. First, the phenomenon of Jobless Growth. Although West Java records relatively good aggregate economic growth, that growth is driven by the manufacturing sector which is increasingly capital-intensive and high-tech rather than labor-intensive. Consequently, the increase in production output and GRDP is not accompanied by adequate labor absorption, keeping unemployment figures high in the midst of areas that statistically look "prosperous". Second, the phenomenon of Educated Unemployment and Selective Behavior. Areas with high GRDP are generally located in urban and industrial zones. In these areas, job seekers are dominated by secondary-and-above graduates who have high wage expectations and desire comfortable working conditions ("well-paying, cozy employment").

Because they have financial support from their families, they prefer to delay working ("wait unemployment") while looking for ideal jobs rather than accepting low-paid informal sector work. This differs from poor areas where residents are forced to take any odd jobs to survive, thus not being recorded as openly unemployed. Third, the occurrence of Skill Mismatch; high numbers of educational graduates are not always in line with the skill specifications required by industry. The mismatch between the supply of graduates and the demand for expertise by companies causes a decline in labor absorption, triggering an increase in unemployment in advanced regions. Capital-intensive economic growth or growth concentrated in capital-intensive sectors often fails to absorb labor optimally, so that an increase in GRDP is not always accompanied by a decrease in unemployment (Nugraha, 2023).

The poverty level is proven to provide a negative and significant impact on GRDP per capita (-0.0293, p-value 0.015). This negative relationship confirms the validity of the Vicious Cycle of Poverty theory proposed by Ragnar Nurkse. Nurkse explained that a region remains poor because of the condition of poverty itself. Low income results in a very low ability to save and invest (Kurniasari and Oktavia, 2023). The lack of investment in physical capital and human capital (such as nutrition and education) causes community productivity to remain low, which in turn again produces low income (Rambe et al, 2023). This chain makes poverty a very strong structural barrier; the higher the percentage of poor people, the lower the purchasing power and aggregate labor quality of a district/city, which ultimately holds back the rate of GRDP per capita.

Several key development variables such as Investment, Capital Expenditure, General Allocation Fund (DAU), and Fiscal Independence (KF) were found to be insignificant in affecting GRDP per capita. This highlights policy transmission inefficiencies :

- Investment (LINVESTK): The insignificance of investment indicates spatial inequality, where investment is concentrated only in certain industrial corridors (such as Bekasi, Karawang, and the Greater Bandung area). This concentration causes the multiplier effect of investment not to spread evenly to all districts/cities in West Java. Furthermore, the nature of the industry as an enclave economy (export-oriented and using imported raw materials/machinery) breaks the linkage with the local MSME sector.
- Capital Expenditure (LBK): Capital expenditure that does not have a significant impact is often caused by the lag effect of infrastructure investment which takes a long time to provide economic returns. Additionally, in line with Hasnul's view in Andiransyah et al (2019), government development spending can become unproductive if its allocation is inefficient, bloated on projects that do not directly impact economic connectivity, or corrupted.

Fiscal Independence (KF): The insignificance of the ratio of Regional Original Revenue (PAD) to GRDP per capita indicates that regional fiscal capacity is still highly dependent on central transfer funds (intergovernmental transfers). Although a region's PAD increases, the amount is often overshadowed by high unemployment and poverty rates which become a social burden for the regional government, so that income is not strong enough to be reinvested as an economic stimulus per capita.

CONCLUSION

Overall, the results of the Williamson Index and Theil Index analysis show that development inequality among districts and cities in West Java Province during the 2014–2024 period remains high and has even increased again following the COVID-19 pandemic. Before the pandemic, inequality had briefly declined, reflecting improvements in regional equity; however, since 2020, disparities have widened again due to an uneven economic recovery that is concentrated in metropolitan areas and industrial zones. The primary source of inequality stems from within regions (intra-region), particularly in metropolitan areas such as Bodebekpunjur and Greater Bandung (Cekungan Bandung), where core cities grow faster than their buffer zones. Furthermore, differences between the northern and southern regions, as well as between districts and cities, also show persistent patterns of inequality, with northern and urban areas enjoying higher growth compared to southern and rural areas. Thus, the main challenge for development in West Java is not only to narrow the gap between large regions but also to balance growth within each respective area through equitable infrastructure distribution, economic diversification, and strengthening the capacity of disadvantaged regions.

Based on the comprehensive Random Effect Model analysis of panel data from 27 Districts/Cities in West Java for the 2018–2024 period, it can be concluded that regional economic inequality (GRDP per capita) is strongly driven by the quality of human capital (HDI) and the smooth flow of public service operational spending (Non-Physical DAK). Conversely, West Java Province faces serious structural

obstacles in the form of demographic explosion burdens (Malthusian pressure) and a vicious cycle of poverty trap that continually restricts the growth rate of individual income. This research also confirms a labor market paradox in West Java involving the phenomena of jobless growth and educated unemployment. Industrial growth in advanced regions fails to absorb the workforce optimally because it is capital-intensive, triggers a skill mismatch, and gives rise to selective attitudes among secondary and higher education graduates who prefer to remain unemployed while searching for high-paying jobs. The failure of physical investment variables and capital expenditure to provide a significant impact further emphasizes the existence of budget allocation inefficiencies and inequality in the distribution of capital across the land of Pasundan

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AUTHOR CONTRIBUTIONS

Conceptualization, Gunawan.; Methodology and Investigation, Gunawan.; Validation and Supervision, Bambang Juanda and Andrea Emma Pravitasari; Formal Analysis, Investigation, Resources, and Data Curation, Gunawan.; Writing – Original Draft Preparation, Gunawan.; Writing – Review & Editing, Bambang Juanda and Andrea Emma Pravitasari.; Visualization, Gunawan.; Funding Acquisition, Gunawan.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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