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Research article

Assessing the Impact of Jakarta-Bandung High-Speed Rail Project toward Regional Socioeconomic Conditions: A Spatial Difference-in-Differences Analysis

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ABSTRACT

This study evaluates the economic impact of the Jakarta–Bandung High-Speed Rail (JB-HSR) project, a key strategic initiative for promoting balanced and sustainable regional economic growth in Indonesia. We analyze four major regional indicators: Gross Regional Domestic Product (GRDP), investment, open unemployment, and poverty levels. Employing a Difference-in-Differences (DID) approach with panel data from 2013 to 2023, our findings reveal that the JB-HSR 's presence significantly increased GRDP and investment, and contributed to a decline in open unemployment within the directly affected regions. However, the project has not yet led to a statistically significant reduction in poverty, indicating uneven distribution of economic benefits across population segments. A spatial analysis further highlights substantial land-use changes around JB-HSR stations, reflecting the potential for future Transit-Oriented Development (TOD). These insights underscore the necessity for integrated spatial planning between central and regional governments, enhancement of local workforce capacities, and the implementation of inclusive investment and social policies to ensure the long-term sustainability and equitable distribution of JB-HSR project benefits.

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1. INTRODUCTION

To promote sustainable economic advancement, the Government of Indonesia consistently enhances the execution of strategic infrastructure initiatives. A prominent endeavor in this regard is the establishment of the Jakarta–Bandung High-speed Rail (JB-HSR), which is designed to augment transportation efficiency by diminishing travel duration and fortifying interregional connectivity, particularly between the national capital and significant metropolitan regions. The JB-HSR is anticipated to invigorate regional economic development, attract heightened investment, increase local government revenues, and expedite the emergence of new urban zones surrounding high-speed rail (HSR) station nodes (Salim & Faoziyah, 2022; and Dai et al., 2021). On a global scale, successful high-speed rail initiatives—such as those implemented in Europe and East Asia—are generally propelled by robust travel demand that surpasses the capacities of traditional rail systems. Prior to the establishment of HSR, these nations had already optimized capacity through the development of dual tracks or supplementary rail lines (Givoni, 2006; and Kurhan et al., 2024). As a result, the advent of HSR represented a timely solution to pressing capacity requirements. Nevertheless, such conditions have yet to be fully actualized in Indonesia. The Jakarta–Bandung corridor, for example, continues to encounter difficulties in cultivating a solid demand base for HSR services, both for commercial and daily commuting needs (Salim & Faoziyah, 2022; and Mahardika et al., 2022). The HSR is widely recognized as a strategic instrument for promoting regional economic growth. Rana et al. (2017) argue that HSR is part of public policy aimed at improving the efficiency of national transportation systems while also reducing regional development disparities. By enhancing connectivity, HSR infrastructure not only facilitates the faster movement of goods and services but also expands access to labor markets and encourages more equitable population mobility.

International studies, such as that by Ye et al. (2022) on the Wuhan–Guangzhou corridor in China, demonstrate a strong correlation between transport infrastructure development, reduced travel costs, and regional economic growth. These findings align with those of Givoni & Banister (2012), who emphasize that HSR shortens long-distance travel times, broadens the scope of daily commuting, and generates new employment opportunities, particularly in suburban and peri-urban areas. Furthermore, Blanquart & Koning (2017), through a systematic review of HSR projects across various countries, find that high-speed rail improves regional accessibility, increases land value, and stimulates local economic growth. However, they also highlight the challenges associated with HSR implementation, including high capital costs and socio-political resistance in certain regions. Similarly, Sugimori et al. (2022), studying the Mumbai–Ahmedabad corridor, observe that the indirect economic effects of HSR arise from complex spatial interactions and sectoral linkages modeled through input–output analysis.

Additionally, Rana et al. (2017); Boto-García et al. (2025); Rodrigues et al. (2024) and Yoshino & Abidhadjaev (2017) apply an econometric approach to examine the effects of HSR on regional inequality. Their findings indicate that regions with better transport connectivity experience more rapid economic growth than isolated areas. Nevertheless, several scholars caution that the success of HSR projects depends heavily on inclusive policy design and implementation. Study by Ou et al. (2025), for example, warn that without equitable and comprehensive planning, HSR may exacerbate regional inequalities, with benefits concentrated in major urban centers along the main corridor. Martin and Rogers further argue that to ensure balanced regional development, HSR must be accompanied by integrative policies that link peripheral areas with key growth centers. In this context, HSR is viewed not merely as a transportation tool, but as a catalyst for regional integration and economic inclusion.

In Indonesia, empirical research on the economic impact of HSR remains limited. Zufarihsan et al. (2025) identifies four major station nodes in the JB-HSR project: Halim, Karawang, Padalarang, and Tegalluar. However, few quantitative studies have comprehensively examined JB-HSR's influence on macroeconomic indicators such as Gross Regional Domestic Product (GRDP), investment levels, open unemployment, and poverty rates. Moreover, there is a lack of analysis linking JB-HSR to adjacent infrastructure, such as the Cimanggis–Cibitung Toll Road, whether in terms of potential synergy or competition. This research gap underscores the need for a study framework that incorporates local context and accounts for the spatial and functional interconnectivity of infrastructure systems

This study employs the Difference-in-Differences (DID) approach to assess the impact of HSR development on regional economic growth. The DID method enables a comparative analysis between regions served by the JB-HSR and other regions with similar characteristics that lack comparable access. This approach not only evaluates economic outcomes but also incorporates spatial dynamics by analyzing variations in land cover as a relevant environmental factor. Previous studies have shown that HSR development significantly influences key economic indicators, including Gross Regional Domestic Product (GRDP), investment levels, open unemployment, and poverty rates. GRDP is frequently used as a primary indicator to evaluate a region's economic performance. Chen & Haynes (2017) emphasized the central role of GRDP in assessing the economic benefits of transport infrastructure investment, such as HSR. This perspective is supported by Givoni (2006), who highlighted the relevance of GRDP in capturing the contribution of HSR to regional growth and productivity.

Another critical indicator is the level of investment, which reflects the extent of economic activity induced by the presence of HSR. Tveter & Holmgren (2024) demonstrated that large-scale transport projects like HSR can attract additional investments from both public and private sectors, ultimately driving broader economic expansion. Similarly, Kurhan et al. (2024) noted that HSR can stimulate investment flows and enhance long-term growth prospects in the areas it serves. In terms of the labor market, open unemployment is a crucial metric. Study by Li et al. (2023) found that HSR development generates new employment opportunities during both the construction and operational phases. Meanwhile, Cai et al. (2022) underscored the role of expanding HSR networks in improving labor market accessibility, thereby contributing to reductions in regional unemployment.

Poverty also remains a key concern in evaluating the success of HSR development. Qian (2024) argued that improved transport connectivity can enhance access for vulnerable groups to labor markets and essential services, thereby helping to reduce poverty levels. Diemer et al. (2022) further stressed the importance of incorporating inclusivity into infrastructure projects to ensure that the resulting economic growth benefits a broad spectrum of the population. Empirical studies have concluded that HSR development in China has contributed to regional GRDP growth, reduced unemployment rates, and attracted increased investment (Chen & Haynes, 2017). In Europe, HSR has enhanced cross-border mobility, boosted the tourism sector, and helped reduce regional disparities (Vickerman, 2015). In the Indonesian context, this study investigates the impact of the JB-HSR project on four key indicators—GRDP, investment, open unemployment, and poverty—by comparing regencies and cities with HSR stations to similar regions without such infrastructure over the period 2013–2023. This research provides a comprehensive evaluation of the socio-economic impacts of JB-HSR at the regional level while also accounting for spatial changes associated with the project. The analysis utilizes official statistical data from 2013 to 2023, including GRDP at constant prices, realized investment figures, open unemployment rates, and poverty percentages.

Based on prior studies, it can be concluded that high-speed rail development has the potential to deliver extensive economic impacts, both direct and indirect. However, in the Indonesian context, there remains a significant lack of in-depth empirical evidence on the influence of JB-HSR on regional economic growth. Accordingly, this study employs a Difference-in-Differences (DID) approach to compare economic developments in areas directly affected by JB-HSR with those of comparable control regions that are not served by HSR. This research seeks to make a meaningful empirical contribution to the growing body of literature on HSR infrastructure impacts in Indonesia. Moreover, the findings are expected to inform the formulation of more strategic, inclusive, and sustainable regional development policies. Therefore, this study seeks to investigate the ramifications of JB-HSR on various regional economic parameters, including Gross Regional Domestic Product (GRDP), levels of investment, open unemployment rates, and poverty metrics. The examination concentrates on regions with direct access to JB-HSR stations—specifically Bandung Regency and West Bandung Regency—and juxtaposes them with areas lacking comparable HSR connectivity, such as Garut, Sukabumi, Subang Regencies, and Cimahi City. The results are expected to furnish an empirical basis for assessing future transportation infrastructure policies, particularly in fostering equitable regional development through contemporary transport connectivity. The rest of this article is organized as follows: second section details the research methods; third section presents the findings alongside a thorough discussion; and fourth section explores the conclusion and implications of the finding and offers policy recommendations.

2. RESEARCH METHODS

2.1. Data

The data are classified into treatment and control groups based on spatial and temporal criteria, with the presence of HSR stations serving as the primary indicator of intervention. The comparison involves evaluating key economic indicators before and after the implementation of the JB-HSR project. To ensure the robustness of the methodology, the study also tests key assumptions underlying the DID approach, including the parallel trends assumption, homogeneity of group characteristics, and structural stability across regions. This study investigates the impact of JB-HSR on regional growth, as measured by gross regional domestic product (GRDP), unemployment rate, investment, and poverty rate. The data source is Indonesian Statistics (BPS). The data description is presented in Table 1.

Table 1. The Description of Variables

Variables	Description	Source
$GRDP_{it}$	The gross regional domestic product, constant (Rp)	BPS
$Unemployment_{it}$	The unemployment rate for each regions per year (%)	BPS
$Investment_{it}$	The investment inflows for each regions per year (Rp)	BPS
$Poverty_{it}$	The poverty rate for each regions per year (%)	BPS
P	year 2013 to 2023	Treatment
DID	Interaction variable for treated individuals during the intervention period	Treatment
T	Treatment coefficient with a dummy variable for Bandung Regency.	Treatment
U_1	Individual Effect (dummy variable for treatment: areas with KCIC stations vs. non-KCIC station areas)	Treatment

2.2. Model Specification

This study employs the Difference-in-Differences (DID) method as a quantitative approach to evaluate the regional economic impacts of HSR development. The DID framework is designed to measure changes resulting from an intervention—such as a public policy initiative, natural disaster, or social phenomenon—by comparing pre- and post-intervention conditions across two groups: a treatment group directly affected by the intervention and a control group that remains unaffected (Gertler et al., 2016). As articulated by Ravallion et al. (2005), the DID approach focuses on a "double-difference" strategy, capturing both temporal and cross-sectional variations. This involves four core stages: (1) conducting a baseline survey in both groups prior to the intervention; (2) collecting follow-up data after the intervention; (3) calculating within-group changes over time; and (4) estimating the net impact by comparing the differential change between the two groups. In the context of this research, the DID strategy is applied empirically to isolate the direct regional effects of HSR development from potential spillover effects in surrounding areas. By adopting a counterfactual framework, the method allows for the estimation of the difference between observed outcomes and hypothetical outcomes that would have occurred in the absence of the intervention (Yoshino & Abidhadjaev, 2017).

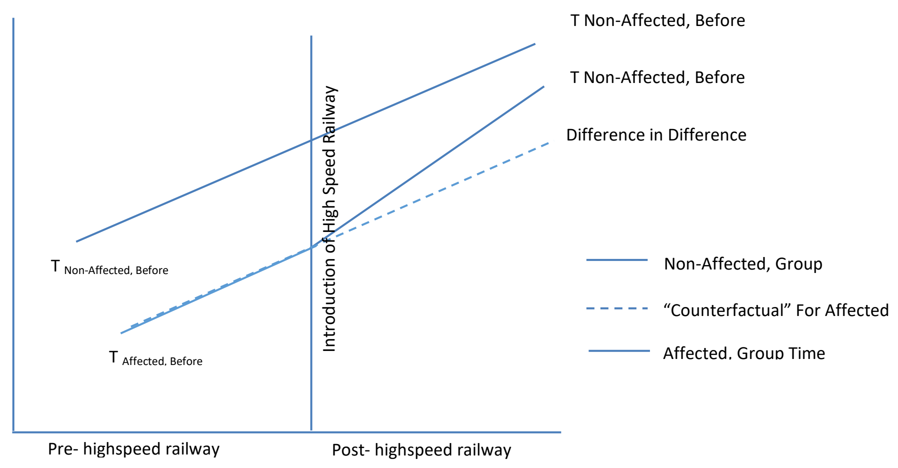

Figure 1. Schematic Illustration of the Analytical Framework for the Economics Indicator

This study evaluates the impact of high-speed rail (HSR) development on regencies and cities traversed by the HSR corridor, particularly those hosting station stops, with respect to key indicators such as economic growth, open unemployment, poverty rates, and investment levels. Within the regression framework, these four indicators are classified as dependent variables. To assess the influence of HSR station development on each of these indicators, an Ordinary Least Squares (OLS) regression model is employed without the inclusion of control variables. The model is specified as follows:

$$GRDP_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 T_{it} + \beta_3 DID_{it} + U_1 + \varepsilon_{it} \quad (1)$$

$$Unemployment_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 T_{it} + \beta_3 DID_{it} + U_1 + \varepsilon_{it} \quad (2)$$

$$Investment_{it} = \beta_1 P_{it} + \beta_2 T_{it} + \beta_3 DID_{it} + U_1 + \varepsilon_{it} \quad (3)$$

$$Poverty_{it} = \beta_1 P_{it} + \beta_2 T_{it} + \beta_3 DID_{it} + U_1 + \varepsilon_{it} \quad (4)$$

Here, $GRDP$ represent the GRDP rill, constant; $Unemployment$ represent the unemployment rate; $Investment$ represent the investment inflow; $Poverty$ represent the poverty rate; P treatment with year 2013 to 2023; DID represent interaction variable for treated individuals during the intervention period; T is treatment coefficient with a dummy variable for Bandung Regency; U_1 is individual effect (dummy variable for treatment: areas with KCIC stations vs. non-KCIC station areas. The hypothesis that will be proven in this study are as follows:

H_0: The development of high-speed rail has no significant effect on the GRDP, the open unemployment rate, investment, and the poverty rate in both station and non-station areas.

H_1: The development of high-speed rail has a significant effect on the GRDP, the open unemployment rate, investment, and the poverty rate in both station and non-station areas.

Land cover change refers to the transformation of natural landscapes into built-up areas driven by various factors such as urbanization, agricultural land conversion, deforestation, and infrastructure development. Understanding the dynamics of such changes is critical for spatial planning, environmental management, and the implementation of sustainable development strategies. Numerous theories and models have been developed to explain land cover change, emphasizing a wide range of driving forces, from population pressure to large-scale infrastructure interventions. In the context of transport infrastructure development, High-Speed Rail (HSR) has emerged as a key driver of spatial transformation. Many countries have adopted HSR to improve interregional mobility, reduce travel times, and stimulate economic growth. However, the introduction of HSR also influences land use patterns, particularly in areas surrounding major transport nodes such as stations. HSR significantly alters regional accessibility, reshaping intercity connectivity and affecting the relative positioning of cities within broader transportation networks (Moyano & Dobruszkes, 2017).

In this study, land cover change is analyzed as an indirect effect of the JB-HSR project. This effect is examined within a Difference-in-Differences (DID) analytical framework, which compares spatial dynamics in regions directly served by JB-HSR against those in control areas with no similar intervention. The goal is to estimate the spatial impacts arising from enhanced accessibility and increased investment around HSR stations. The improvements in accessibility delivered by JB-HSR not only reduce intercity travel times but also generate secondary economic effects, including increased labor productivity, more efficient resource allocation, and accelerated information exchange (Givoni, 2006; and Yin et al., 2015). Lin et al. (2021) find that HSR development can trigger urban sprawl, driven by growing demand for residential and commercial land near connected stations. From an industrial perspective, the reduction in travel costs boosts intercity mobility, which positively affects transportation revenues, stimulates tourism development, and supports growth in the service sector (Guirao et al., 2016; Leheis, 2012; Masson & Petiot, 2009; Pagliara et al., 2017; and Repolho et al., 2012). Moreover, JB-HSR stations hold the potential to evolve into hubs for Transit-Oriented Development (TOD)—a planning strategy that promotes compact, mixed-use development within walking distance of public transportation nodes. The TOD model can guide urban expansion toward more controlled and efficient patterns (Cervero & Murakami, 2009).

The enhanced connectivity associated with JB-HSR also contributes to increased land values, particularly in areas near station locations. This is consistent with international evidence showing that HSR projects can significantly elevate land prices by reshaping spatial value perceptions and generating expectations of future urban growth (Banister, 2012; Wetwitoo & Kato, 2017; and Ye et al., 2022). Therefore, the analysis of land cover change in this study not only offers environmental and spatial insights but also complements the quantitative estimates generated through the DID model regarding JB-HSR's economic impact. The integration of econometric and spatial approaches strengthens the study's capacity to assess the multidimensional effects of high-speed rail development in Indonesia.

3. RESULTS AND DISCUSSION

3.1. Empirical Results

This study focuses on a selection of regions comprising both regencies traversed by the high-speed rail (HSR)—namely Bandung Regency and West Bandung Regency—and those not directly served by the HSR corridor, including Sukabumi Regency, Garut Regency, Subang Regency, and Cimahi City. The purpose of this selection is to evaluate disparities across several economic and social indicators, including gross regional domestic product, open unemployment rates, investment levels, and the poverty rates. The following figure presents the Jakarta–Bandung High-Speed Rail route along with its station locations, as well as the economic growth of regencies and cities in West Java Province in 2022, which serves as the basis for the regional selection used in the comparative analysis.

Table 2. The Descriptive Statistics for Combined Economic Indicators

Descriptive	GRDP	Unemployment	Investment	Poverty rate
Mean	38,691.85	8.69	8.56	8.68
Std. Dev.	19,063.49	1.70	10.47	2.30
Min	16,072.36	3.92	0.31	4.39
Max	92,830.17	13.30	45.87	12.92
n	66.00	66.00	66.00	66.00

Table 2 presents descriptive statistics for combined economic indicators for each regions, including GRDP, Unemployment, Investment, and Poverty Rate, based on a sample size (n) of 66 observations for each variable. The gross regional domestic product shows a wide range, from a minimum of 16,072.36 to a maximum of 92,830.17, with a mean of 38,691.85 and a substantial standard deviation of 19,063.49, indicating significant variability in GRDP across the observed data points. For unemployment rates range from 3.92% to 13.30%, with an average of 8.69% and a standard deviation of 1.70%, suggesting moderate dispersion around the mean unemployment rate. Further, investment figures vary considerably, from a low of 0.31 to a high of 45.87. The mean investment is 8.56, but the high standard deviation of 10.47 indicates a large spread in investment values, pointing to some observations having much higher investment than others. Lastly, the Poverty Rate ranges from 4.39% to 12.92%, with a mean of 8.68% and a standard deviation of 2.30%. This indicates a relatively consistent distribution of poverty rates around the average, though still showing some variability within the data.

Table 3 reports descriptive statistics for economic indicators, such as GRDP, unemployment, investment, and poverty rate, broken down by different regencies and a city: Sukabumi Regency, Bandung Regency, Bandung Barat Regency, Garut Regency, Subang Regency, and Cimahi City. First, Sukabumi Regency shows a mean GRDP of 43,208.45 with a relatively low standard deviation (6,306.77), indicating less variability compared to some other regions. Unemployment averages 8.27% with a small standard deviation of 0.76%, suggesting consistent unemployment rates. Investment averages 6.76 but has a higher standard deviation of 3.57, while the poverty rate is 7.75% with a low standard deviation of 0.98%. Second, Bandung Regency stands out with the highest mean GRDP at 75,615.06 and a larger standard deviation of 11,471.70, implying greater economic output but also more variation. Unemployment averages 7.73%, with a higher standard deviation (2.54) compared to Sukabumi, indicating more spread in unemployment rates. Investment averages 3.37 with a standard deviation of 2.27, and the poverty rate is 8.32% with a standard deviation of 1.20. Thirdly, Bandung Barat Regency has a lower mean GRDP of 29,159.20 with a standard deviation

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of 3,771.80. Unemployment is notably higher at 9.39% with a moderate standard deviation of 1.38. Investment is low at 3.11 with a standard deviation of 2.47, and the poverty rate is the highest among all regions at 10.12% with a standard deviation of 2.40.

Table 3. The Descriptive Statistics for Economic Indicators by Regency

Descriptive	GRDP	Unemployment	Investment	Poverty rate
Sukabumi Regency				
Mean	43,208.45	8.27	6.76	7.75
Std. Dev.	6,306.77	0.76	3.57	0.98
Min	33,520.00	7.32	1.30	6.22
Max	52,993.00	9.60	12.81	9.24
Bandung Regency				
Mean	75,615.06	7.73	3.37	8.32
Std. Dev.	11,471.70	2.54	2.27	1.20
Min	57,690.59	3.92	0.93	6.40
Max	92,830.17	11.52	8.11	9.61
Bandung Barat Regency				
Mean	29,159.20	9.39	3.11	10.12
Std. Dev.	3,771.80	1.38	2.47	2.40
Min	22,937.17	8.11	0.31	6.40
Max	29,159.20	9.39	3.11	10.12
Garut Regency				
Mean	36,532.27	8.06	29.25	10.91
Std. Dev.	4,803.49	0.85	8.84	1.38
Min	29,140.00	7.12	16.74	8.98
Max	44,087.00	9.80	45.87	12.81
Subang Regency				
Mean	26,730.64	8.53	7.73	9.73
Std. Dev.	3,253.31	0.90	3.47	0.90
Min	21,430.00	6.74	4.21	8.12
Max	44,087.00	9.45	45.87	11.31
Cimahi City				
Mean	20,905.50	10.18	1.14	5.22
Std. Dev.	3,224.35	1.91	0.57	0.57
Min	16,072.36	8.00	0.38	4.39
Max	25,931.98	13.30	1.96	5.92

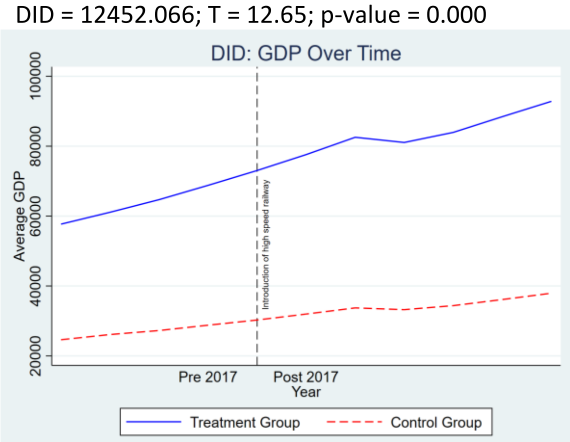
Furthermore, fourth, Garut Regency presents a mean GRDP of 36,532.27 with a standard deviation of 4,803.49. Its unemployment rate is 8.06% with a low standard deviation of 0.85. Notably, Garut has the highest mean investment at 29.25, accompanied by a significant standard deviation of 8.84, suggesting a wide range of investment activities. The poverty rate is also high at 10.91% with a standard deviation of 1.38. Fifth, Subang Regency records a mean GRDP of 26,730.64, similar to Bandung Barat, with a standard deviation of 3,253.31. Unemployment is 8.53% with a standard deviation of 0.90. Investment is relatively high at 7.73 with a standard deviation of 3.47, and the poverty rate is 9.73% with a low standard deviation of 0.90. Finally, Cimahi City shows the lowest mean GRDP at 20,905.50 with a standard deviation of 3,224.35. It has the highest mean unemployment rate at 10.18% with a standard deviation of 1.91. Investment in Cimahi is the lowest at 1.14 with a very small standard deviation of 0.57, indicating consistently low investment. However, Cimahi has the lowest poverty rate at 5.22% with a very low standard deviation of 0.57, suggesting a relatively low and consistent poverty level.

Figure 2 displays the results of a Difference-in-Differences model estimation, illustrating the trends of average GRDP and Average Unemployment Rate over time for both a treatment group and a control group, with 2017 marked as the year of intervention (introduction of high-speed railway). Figure 2 reports the DID: GRDP Over Time graph (left panel), both the treatment group (solid blue line) and the control group (dashed red line) show an increasing trend in average GRDP from the pre-

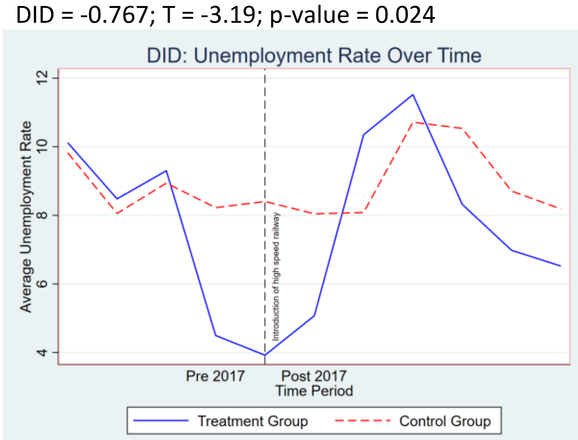
2017 to the post-2017 period. However, the treatment group exhibits a steeper increase in GRDP post-2017 compared to the control group. This divergence suggests that the introduction of the high-speed railway in 2017 had a positive and more pronounced impact on the GRDP of the treatment group, indicating a potential causal effect of the intervention on economic growth.

The DID for unemployment rate over time graph (right panel) reveals a more complex pattern. In the pre-2017 period, both groups show fluctuations in unemployment, with the Treatment Group generally having a lower unemployment rate than the control group. Post-2017, the Treatment Group experiences a significant initial drop in unemployment, followed by a rise and then another decline. The control group's unemployment rate, while also fluctuating, tends to remain higher and follows a somewhat different trajectory. The notable dip in the treatment group's unemployment rate immediately after 2017, followed by a general trend of lower unemployment compared to the control group in the later post-intervention years, suggests that the high-speed railway might have contributed to reducing unemployment in the treated regions, although the overall trend is less straightforward than that observed for GRDP. The DID estimation would quantify the average treatment effect by comparing the change in unemployment in the treatment group relative to the change in the control group.

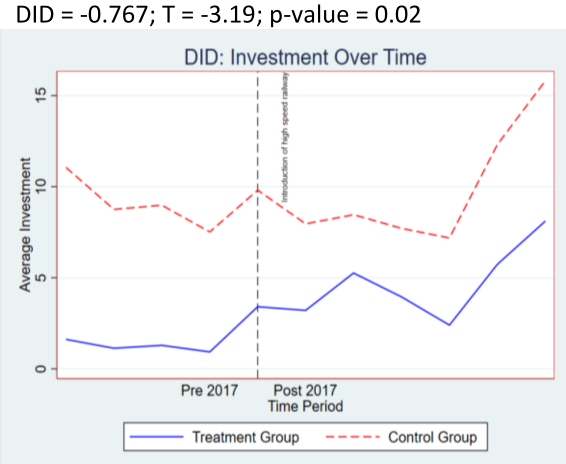
Dep. variable = GRDP
DID = 12452.066; T = 12.65; p-value = 0.000



Dep. variable = Unemployment
DID = -0.767; T = -3.19; p-value = 0.024



Dep. variable = Investment
DID = -0.767; T = -3.19; p-value = 0.02



Dep. variable = Poverty Rate
DID = 2.524; T = 2.83; p-value = 0.037

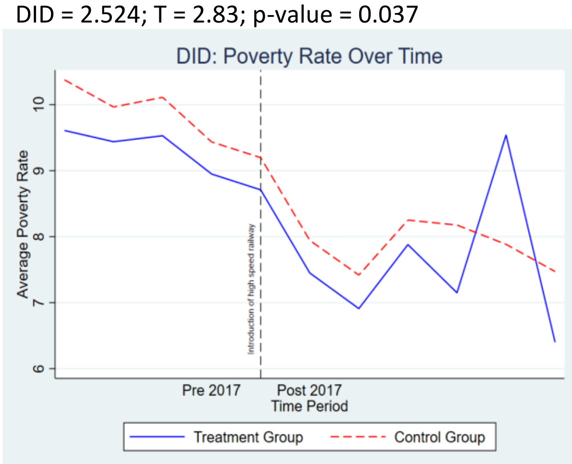


Figure 2. DID Estimation for Impact of JB-HSR on GRDP, Unemployment, Investment, and Poverty rate

In the DID for Investment over time graph (left panel), the Control Group (dashed red line) consistently shows higher average investment than the treatment group (solid blue line) both before and after 2017. Pre-2017, both groups exhibit some fluctuations, with the control group generally trending downwards slightly and the treatment group remaining relatively low. Post-2017, the control group experiences a significant increase in investment, while the Treatment Group also shows an increase, but it remains at a much lower level than the control group and displays more volatility. This pattern suggests that the introduction of the high-speed railway did not lead to a relative increase in investment in the Treatment Group compared to the control group; in fact, the gap in investment between the two groups appears to widen post-intervention, with the Control Group showing stronger investment growth.

For the DID poverty rate over time graph (right panel), both the treatment and control groups show a general decline in poverty rates from the pre-2017 to the post-2017 period. Before 2017, the control group generally has a higher poverty rate than the treatment group. After the introduction of the high-speed railway in 2017, the treatment group's poverty rate experiences a more pronounced and consistent decline, although there is a noticeable spike around 2019-2020 before continuing its downward trend. The control group's poverty rate also declines but at a slower and more fluctuating pace. This suggests that the high-speed railway may have contributed to a greater reduction in poverty rates in the treated regions compared to the control regions, indicating a positive impact on poverty alleviation.

The Difference-in-Differences (DID) analysis reveals that the development of the high-speed rail (HSR) corridor has had a statistically significant impact on several regional economic indicators. Notably, GRDP increased by IDR.12,452.07, while the open unemployment rate declined by 0.767 percentage points. Although investment levels also rose, the regression model suggests that other variables may have concurrently influenced this outcome. In contrast, no significant effect was observed on poverty rates. These findings underscore the importance of employing a mixed-method approach, combining quantitative evaluation techniques such as DID with spatial monitoring of land use changes. They also highlight the need for cross-sectoral coordination in implementing Transit-Oriented Development strategies around HSR station areas.

The DID analysis indicates that the development of the JB-HSR has produced varying impacts across regional economic indicators. Table 4 reports the regression results reveal that the high-speed rail (HSR) corridor has a statistically significant positive effect on Indonesia’s GRDP. The treatment variable, indicated by a highly significant coefficient of IDR 36,383.809, suggests that regions affected by HSR exhibit an average GRDP that is IDR 36,383.809 higher than that of the control group, holding other variables constant. Additionally, the post-treatment period variable displays a positive coefficient of IDR 7,254.843, implying an average GRDP increase of that amount across all regions following the intervention period. This finding confirms a substantial and statistically significant temporal trend. Most importantly, the DID interaction coefficient, which captures the combined effect of both treatment status and the post-intervention period, is positive and statistically significant at IDR 12,452.066. This suggests that, after accounting for general time trends and group-specific differences, the JB-HSR project contributed to an average GRDP increase of IDR 12,452.066 in the treatment group relative to the control group.

Table 4. The Regression Result for JB-HSR Impact on GRDP

Dependent variable = GRDP						
Variables	**Coefficient**	**Std. Error**	***t*-test**	***p*-value**	**95% Conff.**	**Interval**
Treatment	36,383.80***	3,302.09	11.02	0.000	27,895.50	44,872.11
Post	7,254.84***	984.30	7.37	0.001	4,724.60	9,785.07
DID	12,452.06***	984.30	12.65	0.000	9,921.83	14,982.30
Constant	26,690.49***	3,302.09	8.08	0.000	18,202.18	35,178.79
Mean dependent var	38,383.80					
R-square	0.832					
Akaike Crit	1,373.48					
SD dependent var	19,063.48					
Bayesian crit (BIC)	1,377.85					
Number of obs	66					

Note: The significance levels at ***p-value < 0.01; **p-value < 0.05; and *p-value < 0.10

Table 5 report the coefficient for the treatment group is -0.661 (p = 0.091). This negative value suggests that, prior to the intervention, the treatment group exhibited a slightly lower unemployment rate compared to the control group. The p-value of 0.091 indicates marginal statistical significance at the 10% level, implying weak evidence of baseline differences in unemployment between the two groups. The post-intervention period coefficient is 0.193 (p = 0.458). This value reflects the overall change in unemployment rates across both groups following the intervention. Although the positive coefficient suggests a slight increase in unemployment after 2017, the high p-value indicates that this change is not statistically significant. In other words, there is no substantial evidence of a time-related effect on unemployment levels across the treatment and control groups.

Table 5. The Regression Result for JB-HSR Impact on Unemployment

Dependent variable = Unemployment						
Variables	**Coefficient**	**Std. Error**	***t*-test**	***p*-value**	**95% Conff.**	**Interval**
Treatment	-0.661*	0.317	-2.09	0.091	-1.477	0.154
Post	0.193	0.241	0.90	0.458	-0.425	0.812
DID	-0.767**	0.241	-3.19	0.024	-1.385	-0.148
Constant	8.760***	0.317	27.61	0.000	7.945	9.576
Mean dependent var	8.692					
R-square	0.071					
Akaike Crit	255.412					
SD dependent var	1,700					
Bayesian crit (BIC)	259.791					
Number of obs	66					

Note: The significance levels at ***p-value < 0.01; **p-value < 0.05; and *p-value < 0.10

The Difference-in-Differences estimate of -0.767 (p = 0.024) indicates a statistically significant decline in unemployment in the treatment group relative to the control group following the intervention (Table 5). Meanwhile, the overall change in unemployment across both groups is not statistically significant (p = 0.458), the intervention appears to have contributed to a localized reduction in unemployment in areas directly affected by the project. However, the low R^2 value (0.071) suggests that other unobserved factors may also be influencing unemployment trends, underscoring the need for a broader analytical perspective.

Table 6. The Regression Result for JB-HSR Impact on Investment

Dependent variable = Investment						
Variables	**Coefficient**	**Std. Error**	***t*-test**	***p*-value**	**95% Conff.**	**Interval**
Treatment	-7.835	5.460	-1.44	0.211	-21.87	6.199
Post	0.817	0.891	0.92	0.402	-1.474	3.107
DID	2.524**	0.891	2.83	0.037	0.233	4.814
Constant	9.078	5.460	1.66	0.157	-4.957	23.113
Mean dependent var	8.559					
R-square	0.055					
Akaike Crit	496.585					
SD dependent var	10.472					
Bayesian crit (BIC)	500.964					
Number of obs	66					

Note: The significance levels at ***p-value < 0.01; **p-value < 0.05; and *p-value < 0.10

Table 6 reports the regression result for JB-HSR impact on investment, the findings show that the coefficient for the treatment group is negative (-7.835), indicating that, on average, investment levels were lower in the treatment group compared to the control group prior to the intervention. However, this effect is not statistically significant (p = 0.211), suggesting that there is insufficient evidence to conclude that the treatment group systematically exhibited lower investment levels before the intervention. Post-Intervention period following the intervention, overall investment levels showed a slight increase (coefficient = 0.817, p = 0.402); however, this change is not statistically significant. In contrast, the DID estimate (2.524, p-value = 0.037) reveals a statistically

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significant positive effect of the intervention on investment within the treatment group. This finding suggests that the intervention was effective in stimulating investment in the affected areas compared to the control group.

Table 7 reports the regression result for JB-HSR impact on poverty rate, this finding shows that the negative coefficient (-0.59) indicates that before the intervention, the treatment group showed a slightly lower poverty level compared to the control group. However, this effect is not statistically significant (p = 0.66), indicating no strong evidence of a pre-existing difference in poverty levels between the two groups. Following the intervention, poverty rates declined significantly across both groups (coefficient = -1.924, p = 0.011), suggesting a general improvement over time. However, the DID estimate (0.261, p = 0.615) indicates no statistically significant difference in the effect of the intervention between the treatment and control groups. This implies that while poverty levels decreased overall, the intervention itself did not produce a differential impact on poverty reduction.

Table 7. The Regression Result for JB-HSR Impact on Poverty Rate

Dependent variable = Poverty Rate						
Variables	**Coefficient**	**Std. Error**	***t*-test**	***p*-value**	**95% Conff.**	**Interval**
Treatment	-0.590	1.264	-0.47	0.660	-3.839	2.658
Post	-1.924**	0.487	-3.95	0.011	-3.177	-0.671
DID	0.261	0.487	0.54	0.615	-0.991	1.514
Constant	9.973***	1.264	7.89	0.001	6.724	13.222
Mean dependent var	8.678					
R-square	0.162					
Akaike Crit	288.621					
SD dependent var	2.301					
Bayesian crit (BIC)	293.000					
Number of obs	66					

Note: The significance levels at ***p-value < 0.01; **p-value < 0.05; and *p-value < 0.10

Overall, the DID results confirm that the JB-HSR project has contributed to economic improvements in areas surrounding the station nodes. However, the impact has not yet extended significantly to social dimensions, such as poverty alleviation. This underscores the need for complementary and inclusive policy measures to ensure that the benefits of infrastructure development are more broadly distributed across society.

3.1.1. The Jakarta–Bandung High-Speed Rail Impact for Spatial Changes in Land Cover

Figure 3 reports the development of the Jakarta–Bandung High-Speed Rail has triggered significant land cover changes in the areas it traverses, particularly around station locations such as Tegalluar, Padalarang, and Karawang. Land cover maps from 2011, 2017, and 2022 indicate a 23.04% reduction in open land and a notable increase in built-up areas—45.07% in West Bandung Regency and 25.53% in Bandung Regency. These conversions primarily occurred on agricultural land and shrub areas. These spatial changes correlate with positive economic outcomes, including a GRDP increase of IDR 12,452 billion and investment growth 2.524 points higher in JB-HSR station areas compared to control regions. Additionally, open unemployment declined significantly by 0.767 percentage points in affected areas. Land suitability mapping further highlights that zones along the JB-HSR corridor present high potential for Transit-Oriented Development (TOD). Such a strategy could channel growth into controlled urban zones. However, in the absence of strict zoning regulations, rising land values (by 30–45%) may place increasing pressure on local communities and productive land resources.

According to regional spatial planning documents, the areas surrounding high-speed rail (HSR) nodes exhibit considerable potential for land development. Around Padalarang Station (West Bandung Regency), the land development potential is estimated at 21.05%, while the area near Tegalluar Station (Bandung Regency) shows a potential of 6.33%. Both locations present strategic opportunities for infrastructure expansion and more integrated spatial functions. Within the framework of the Detailed Spatial Plan (RDTR), both stations have been designated as part of

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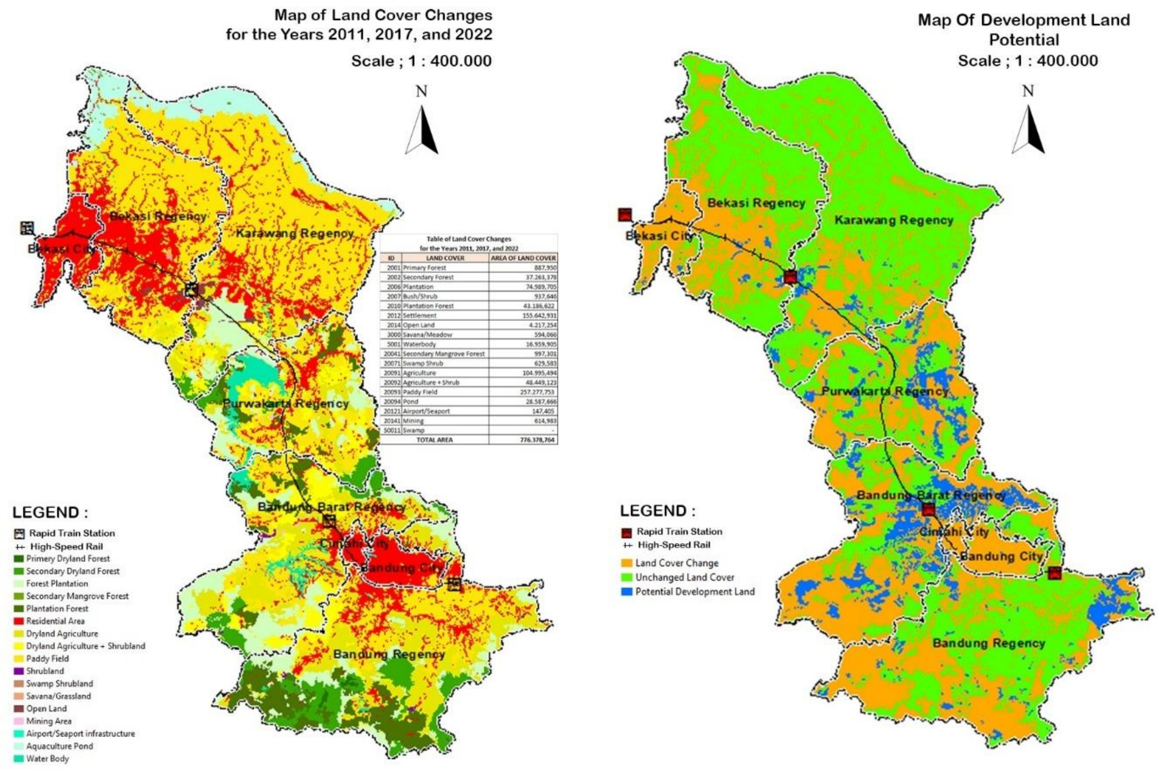
Transit-Oriented Development (TOD) zones—a planning concept centre on integrated public transport systems. Under this paradigm, HSR stations serve not only as transit nodes but also as economic, commercial, and residential hubs, thereby supporting spatially connected, well-planned, and sustainable regional development.



(a) Land Cover Change (b) Potential Development Land

Figure 3. Land Cover Change and Potential Development Land

3.1.2. Spatial Planning Framework for Tegalluar and Padalarang Station

Figure 4 report the Spatial Planning Framework for Tegalluar and Padalarang Station, located in Cileunyi District, Bandung Regency, serves as a key node within the Jakarta–Bandung High-Speed Rail network. Situated in eastern Bandung, the area has been designated as the Tegalluar Integrated Residential Area (KTP) based on Transit-Oriented Development principles, with a planned development area of 3,724.61 hectares, as outlined in the Detailed Spatial Plan (RDTR) and Regent Regulation No. 24 of 2021. The TOD concept in this area aims to integrate public transportation infrastructure with mixed-use zoning, encompassing residential, commercial, industrial, and green open spaces. The presence of the high-speed rail line, the planned Light Rail Transit (LRT), and the expansion of the Bus Rapid Transit (BRT) system reinforces Tegalluar role as an emerging growth centre within Greater Bandung. The DID analysis conducted in this study indicates that the area surrounding Tegalluar Station has experienced greater increases in GRDP and investment compared to control regions. However, the accompanying land conversion and urbanization pressures highlight the need for adaptive spatial planning to mitigate risks of unequal access and environmental degradation. In this context, the integration of JB-HSR and the TOD-based development of Tegalluar holds significant potential to serve as a catalyst for inclusive and sustainable regional development, provided it is supported by coordinated, cross-sectoral policy interventions. Meanwhile, Padalarang Station, located in West Bandung Regency, plays a strategic role as an intermodal hub connecting the JB-HSR with conventional rail services, including both local and long-distance trains. The surrounding area has been designated as a transit-oriented development (TOD) zone, as outlined in the Spatial Plan for the Padalarang Station Area (2021). According to this plan, the station area is subdivided into several functional blocks, including a transit hotel block, meeting, incentive, convention and exhibition (MICE) centre, and micro, small, and medium enterprises (MSMEs) centre, healthcare clinics, and multi-level parking facilities.

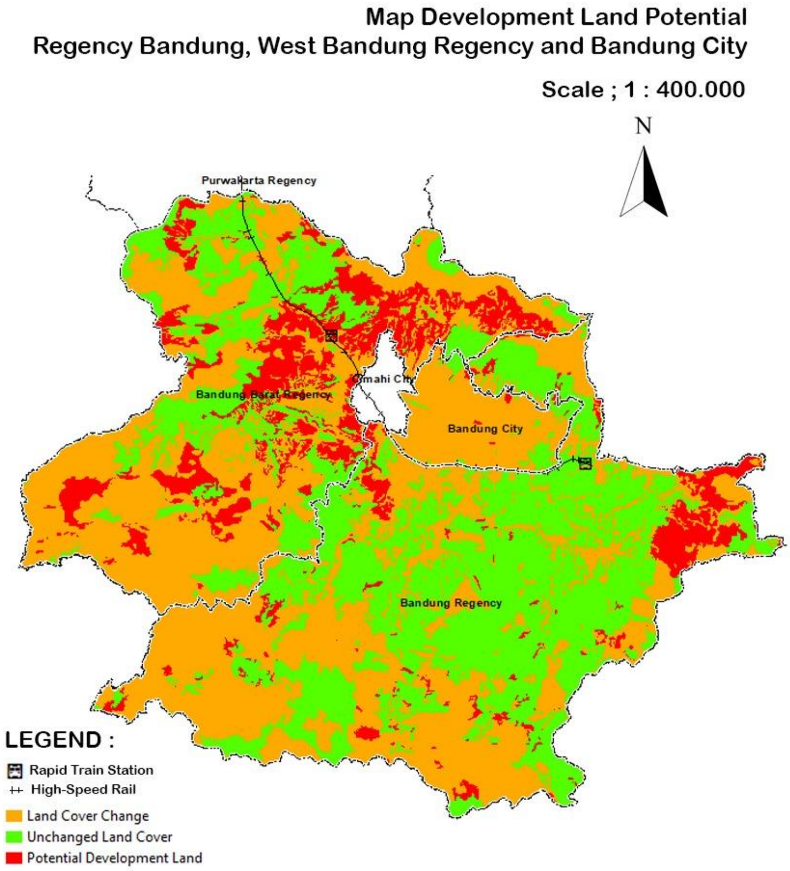


Figure 4. The Potential Transit-Oriented Development Zoning

This spatial configuration aims to stimulate new economic activity, particularly in the services, tourism, and light logistics sectors. The spatial design also incorporates visioning-based planning focused on land use intensity, building heights, and intermodal connectivity optimization. Spatial analysis in the planning document shows a gradual increase in built-up land at an average rate of 1.16% per year (2011–2015), accelerating to 1.37% per year (2015–2020). In contrast, non-built-up land declined by 0.82% and 0.97% over the same respective periods. These trends indicate a gradual transformation from a semi-rural area into a new urban growth centre, driven by the presence of a regionally significant transport node. Although the projected volume of KCJB transit passengers at Padalarang Station is still an estimate—approximately 5,482 passengers per day or 2 million annually—the area has clearly begun transitioning toward a medium-intensity transit zone. Unlike Tegalluar Station, which is primarily oriented toward residential-based TOD, Padalarang emphasizes intermodal connectivity and service- and logistics-oriented regional development. As such, Padalarang Station functions as a catalyst for accelerating spatial transformation in West Bandung Regency and serves as a model for the integration of transport infrastructure and land use planning.

3.2. Discussions

3.2.1. The Jakarta–Bandung High-speed Rail Impact on Regional Economic

A Difference-in-Differences analysis of the JB-HSR project demonstrates a multifaceted impact on regional economic indicators, particularly highlighting a significant positive impact on GRDP. The regression results definitively indicate that the HSR corridor has a statistically significant positive effect on Indonesia's GRDP. The treatment variable, representing areas directly impacted by the HSR, has a highly significant. This implies that, on average, GRDP in these treatment areas is Rp36,383,809 higher than in comparable control areas, assuming all other influencing factors remain constant. This finding aligns with established literature on the economic benefits of improved transportation infrastructure, where improved connectivity and reduced travel times typically drive increased economic activity. Furthermore, the analysis indicates a generally positive temporal trend, with the post-treatment period variable exhibiting a positive coefficient. This implies that, across all regions (both treatment and control), there was an average increase in GRDP of this magnitude after the intervention period, confirming a substantial and statistically significant overall economic growth trend over the study period.

Importantly, the DID interaction coefficient, which isolates the specific impact of the High-Speed Rail project by accounting for common time trends and inherent differences between groups, is positive and statistically significant. This indicates that the JB-HSR project specifically contributed to an average increase in GRDP of Rp12,452,066 in the treatment group relative to the control group. These direct and incremental effects underscore the project's success in stimulating regional economic output beyond the typical growth trajectory. This finding aligns with the experience of other countries that have invested in high-speed rail. For example, studies of China's extensive HSR network have frequently reported positive impacts on regional economic growth, often attributed to improved accessibility, lower transportation costs, increased factor mobility, and the promotion of urban agglomeration effects (Li et al., 2023; and Ye et al., 2022). Similarly, research on HSR impact in Spain and France has also shown a positive impact on GDP in connected regions, primarily due to improved accessibility and increased economic ties between regions (Masson & Petiot, 2009; and Monzón et al., 2013). Japan's Shinkansen, a pioneer of HSR, has also shown a positive correlation with regional GDP, although some studies suggest these benefits may be more pronounced in larger urban centers or are temporary during the construction phase (Miwa et al., 2022; Perl & Goetz, 2015). However, it is important to acknowledge that this literature also presents some nuances and potential caveats. While high-speed rail generally promotes economic growth, some studies, particularly in the context of smaller or less developed cities, have pointed to a potential "siphon effect," where resources (e.g., talent, capital, businesses) may be diverted from smaller cities to larger, more developed centers connected by high-speed rail, potentially exacerbating regional disparities (Gu, 2023). The overall economic impact can also be influenced by factors such as government efficiency, the innovation environment, and the region's existing industrial structure (Hu & Xu, 2022; and Lin et al., 2021). The significant positive impact of the Jakarta-Bandung High Speed Rail on GRDP indicates that, at least in the aggregate for the analyzed region, the agglomeration and accessibility benefits have outweighed potential siphoning or displacement effects, contributing to a strong increase in economic output in the directly affected areas. The magnitude and statistical significance of the DID interaction coefficient provide strong evidence of the economic benefits of this large-scale infrastructure project in Indonesia.

3.2.2. The Jakarta–Bandung High-speed Rail Impact on Unemployment

The Difference-in-Differences analysis of the JB-HSR project regarding its impact on unemployment yields nuanced results; this indicates that the coefficient for the treatment group has a negative sign. This negative value suggests that, in the period prior to the HSR intervention, the regions designated as the treatment group (those affected by the HSR) exhibited a slightly lower unemployment rate compared to the control group. This implies weak evidence of pre-existing baseline differences in unemployment levels between the two groups, a factor that the DID methodology is designed to account for. The coefficient for the post-intervention period is a positive value that reflects the overall change in unemployment rates across both groups (treatment and control) following the 2017 intervention. Although the positive coefficient suggests a slight average increase in unemployment across all regions after 2017, this change is not statistically significant. In practical terms, there is no substantial evidence to suggest a general, time-related effect on unemployment levels that uniformly impacted both treatment and control groups during the post-intervention period. This highlights the importance of the interaction term in isolating the specific effect of the intervention. The core finding of the DID model is encapsulated in the Difference-in-Differences estimate; this statistically significant negative coefficient indicates that, after accounting for initial baseline differences and general time trends, there was a significant decline in the unemployment rate in the treatment group relative to the control group following the JB-HSR intervention. While the overall change in unemployment across both groups was not statistically significant (as evidenced by the post-intervention period coefficient), this specific interaction effect strongly suggests that the HSR project contributed to a localized reduction in unemployment in the areas directly affected by its development. This could be attributed to increased demand for labor in construction, service industries, or related businesses spurred by improved connectivity and economic activity in the HSR corridor.

These findings align with some international experiences where major infrastructure projects, particularly high-speed rail, have been linked to employment generation. For instance, studies on the construction and operation phases of HSR lines in China have demonstrated direct and indirect employment creation, especially in the construction sector and subsequently in service industries along the HSR corridors (Hu & Xu, 2022; and Lin et al., 2021). Similarly, the development of high-speed rail in European countries has been associated with employment opportunities, particularly in and around stations and in related industries that benefit from improved accessibility (Monzón et al., 2013; and Vickerman, 2015). However, it is also important to note that the long-term employment impacts can be complex and may not always be uniformly positive across all skill levels or regions, as some jobs may be temporary or concentrated in specific sectors (Givoni, 2006).

3.2.3. The Jakarta–Bandung High-speed Rail Impact on Investment

The Difference-in-Differences model estimation for the Jakarta-Bandung High-Speed Rail (JB-HSR) project's impact on investment reveals a significant positive effect despite initial baseline differences. The coefficient for the treatment group is negative, suggesting that the averages of regions within the treatment group (those directly impacted by the HSR) had lower investment levels compared to the control group prior to the intervention. However, this initial difference is not statistically significant, implying that there is insufficient evidence to conclude a systematic pre-existing disparity in investment levels between the two groups before the HSR's introduction. This lack of strong baseline difference is a favorable condition for the validity of the DID approach, as it reduces concerns about pre-existing trends biasing the results. Regarding the post-intervention period, the coefficient is positive, but the statistically insignificant value indicates that across both treatment and control groups, there was a slight overall increase in investment levels after 2017. However, the high p-value suggests that this general temporal change in investment is not robust enough to be considered statistically significant, meaning that other factors likely contribute more to the overall investment trends observed in the broader region. Crucially, the core finding lies in the DID estimate, which has a positive and significant effect. This statistically significant positive coefficient reveals a direct and meaningful impact of the HSR intervention on investment within the treatment group. It suggests that, after accounting for both the initial differences between the groups and the general time trends affecting all regions, the JB-HSR project effectively stimulated an average increase of 2.524 units in investment in the affected areas relative to the control group. This finding underscores the HSR's role as a catalyst for economic activity, attracting capital and fostering development in its immediate vicinity.

This positive impact on investment aligns with numerous international experiences. High-speed rail projects are often seen as drivers of investment due to several mechanisms. Firstly, improved accessibility and reduced travel times can make regions more attractive for businesses seeking to expand or relocate, leading to increased foreign direct investment and local business expansion. For example, studies on China's HSR network have shown that HSR connectivity can significantly boost fixed asset investment in cities along the lines, stimulating future economic growth (Li et al., 2023; and Ye et al., 2022). Secondly, HSR can trigger real estate development and urban regeneration around stations, attracting significant private investment in commercial, residential, and mixed-use properties. Japan's Shinkansen, for instance, has been associated with increased property values and development in station areas (Abe et al., 2014). Similarly, Spain's HSR network has spurred economic growth in connected urban areas, partly through increased property values and real estate development (Guirao et al., 2016). Thirdly, enhanced connectivity can foster agglomeration economies, where the clustering of businesses and talent leads to increased productivity and, consequently, higher investment. While some literature points to potential "siphon effects" where resources might be drawn from smaller, unconnected areas to major HSR hubs (Pagliara et al., 2022), the significant positive DID coefficient for the JB-HSR suggests that the project has successfully generated new investment opportunities in the treated regions, rather than merely redistributing existing investment. The statistically significant positive effect on investment observed in the Jakarta-Bandung HSR case reinforces the argument that strategic infrastructure development can be a powerful tool for stimulating regional economic growth and attracting capital.

3.2.3. The Jakarta–Bandung High-speed Rail Impact on Poverty Rate

The Difference-in-Differences analysis of the JB-HSR project's impact on poverty rate presents a different picture compared to its effects on GRDP and investment, highlighting the complex relationship between infrastructure development and social welfare. The coefficient for the treatment group is negative, suggesting that, prior to the HSR intervention, the treatment group (regions affected by the HSR) had a slightly lower poverty level than the control group. However, this observed difference is not statistically significant, meaning there is no strong evidence of a pre-existing disparity in poverty levels between the two groups. This lack of significant baseline difference is beneficial for the robustness of the DID methodology. The analysis further shows that following the intervention, poverty rates experienced a significant decline across both the treatment and control groups, as evidenced by a coefficient that has a negative and significant effect. This significant negative coefficient implies a general improvement in poverty levels over time across all regions, irrespective of their proximity to the HSR, suggesting broader macroeconomic or social trends contributing to poverty reduction during the study period. However, the crucial DID estimate for poverty rate is positive and insignificant. This indicates that there is no statistically significant differential impact of the HSR intervention on poverty reduction between the treatment and control groups. In simpler terms, while poverty levels generally decreased, the HSR project itself did not produce a unique or additional effect on poverty alleviation in the treated areas compared to the natural decline observed in the control areas. This contrasts sharply with the positive and significant impacts observed for GRDP and investment.

This finding aligns with a body of literature suggesting that large-scale infrastructure projects, while boosting economic indicators like GDP and investment, do not always automatically translate into direct and immediate poverty reduction, especially in the absence of complementary policies. For instance, studies on high-speed rail in China have shown that while HSR can contribute to regional economic growth, its direct impact on income distribution and poverty alleviation can be limited or even uneven, sometimes exacerbating existing inequalities if the benefits primarily accrue to specific segments of the population or already developed areas (Hu & Xu, 2022; and Li et al., 2020). Similarly, research on infrastructure development in other developing countries often highlights that for poverty reduction benefits to materialize, investments must be accompanied by policies that ensure equitable access to opportunities, labor market integration for vulnerable groups, and targeted social programs (Edwards et al., 2024; and J. Li et al., 2024).

The overall DID results for the JB-HSR project confirm its contribution to economic improvements in areas surrounding the station nodes, as evidenced by the positive impacts on GRDP and investment. However, the lack of a statistically significant differential impact on the poverty rate underscores that the benefits have not yet extended significantly to social dimensions, such as direct poverty alleviation. This highlights a critical policy implication: relying solely on large-scale infrastructure projects to trickle down benefits to the poorest segments of society may be insufficient. It underscores the urgent need for complementary and inclusive policy measures. These might include vocational training programs for local residents, support for small and medium-sized enterprises (SMEs) to leverage new economic opportunities, targeted social safety nets, and initiatives to improve access to education and healthcare in HSR-affected communities. Such integrated approaches are essential to ensure that the economic gains from infrastructure development are more broadly distributed across society, leading to more equitable and inclusive development outcomes.

4. CONCLUSIONS

The development of the Jakarta–Bandung High-Speed Rail has a significant impact on regional economic growth in the areas served by the corridor. Using a Difference-in-Differences (DID) approach, the study found that regions hosting JB-HSR stations experienced higher increases in GRDP and investment, alongside a notable reduction in open unemployment rates by 0.767 percentage points. However, the impact on poverty reduction remains statistically insignificant. From a spatial perspective, land conversion into built-up areas has occurred intensively around JB-HSR nodes—particularly in Tegalluar, which is emerging as an integrated residential TOD zone, and Padalarang, which is positioned as an intermodal hub and service center. These dynamics reflect significant opportunities for regional economic transformation, but also pose risks of urban sprawl and social exclusion if not managed appropriately.

Recommendations of this study, firstly, harmonization of spatial planning through strengthen integration between national and local spatial planning efforts, particularly in land-use regulation and zoning around JB-HSR nodes, to ensure development aligns with sustainability principles. Second, community-based investment incentives through Formulate inclusive fiscal and non-fiscal policies that support local investment, including the promotion of MSMEs and community-driven economic activities in areas such as Tegalluar and Padalarang. Third, protection and participation of local communities through develop mechanisms to protect vulnerable groups from land price inflation and gentrification pressures, while ensuring active public participation in planning and area development processes. The lastly, enhanced intermodal connectivity through accelerate the integration of feeder transportation systems—including LRT, BRT, and local transit services—to improve access to JB-HSR stations, particularly for local workers and small business operators. The future research is recommended to explore the long-term impacts of HSR development on spatial structure and socio-economic dynamics, including changes in land value, labor mobility, and the effectiveness of TOD policy implementation. A multidisciplinary approach—combining quantitative, spatial, and socio-economic analyses—will be essential to developing a more comprehensive understanding of the transformations induced by high-speed rail infrastructure in Indonesia.

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Authors Contribution: B.D. and B.B provided critical revisions to the manuscript and supervised the project. B.K. and A.F. designed and conducted the study, analyzed the data, and wrote the manuscript. B.K., A.F., B.D., and B.B. contributed to the data collection and assisted in data analysis. All authors read and approved the final manuscript.

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