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THE EFFECT OF ROAD INFRASTRUCTURE AND ELECTRICITY CONSUMPTION ON INVESTMENT AND ECONOMIC GROWTH IN BALI PROVINCE

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Abstract
This study aims to evaluate the effect of road infrastructure and electricity consumption on investment levels and economic growth in Bali Province. Infrastructure is considered a crucial element in stimulating economic activity and attracting investment. Adequate road networks facilitate the distribution of goods and services, while sufficient electricity supply serves as an essential enabler for industrial and business activities. This research utilizes secondary data collected from 2019 to 2023, sourced from the Central Statistics Agency (BPS) and other relevant institutions. Data analysis was conducted using panel data regression methods to examine both direct and indirect effects between variables. The Chow test, Hausman test, and Lagrange Multiplier test were employed to determine the most appropriate panel model. The results indicate that road infrastructure has a positive effect on investment. Conversely, electricity consumption shows a negative effect on investment. In terms of economic growth, road infrastructure again exhibits a positive contribution, while electricity consumption demonstrates a negative effect. Furthermore, investment has a positive but statistically insignificant effect on economic growth. The finding of a negative effect from electricity consumption contradicts the initial expectations. This may be due to the fact that high electricity consumption does not necessarily reflect increased productivity. The bulk of electricity usage is likely attributed to the household or tourism sectors, whose contributions to long-term investment and productive sectors are relatively limited.
Moreover, economic growth is not found to significantly mediate the relationship between road infrastructure and electricity consumption in enhancing regional economic performance.

Keywords: Road Infrastructure, Electricity Consumption, Investment, Economic Growth, Bali Province

INTRODUCTION

The primary goal of national development is to improve the quality of life and ensure equitable welfare for society across all regions. In this context, the government plays a vital role as the driving force of development, both to support public welfare and to stimulate the pace of national economic growth. Economic growth itself serves as one of the main indicators for assessing the success of

development, as well as a reference for formulating future development policies (Risma Niswati Tarman et al., 2023).

On September 22, 2023, the Asian Development Bank (ADB) approved a USD 500 million loan facility as part of its support for Indonesia's reform and priority development programs. This loan aims to create a more competitive investment climate, reduce trade barriers, and encourage the scaling up of business operations. The initiative forms the second subprogram in a three-part series under the Competitiveness, Industrial Modernization, and Trade Acceleration Program (CITA) (Metro Manila, Philippines, 2023).

During his administration, President Joko Widodo initiated the "Nawacita" program, which emphasizes inclusive development, particularly in underdeveloped and border areas. One of the key strategies in addressing development gaps is through infrastructure development. Achievements in infrastructure during one leadership period provide a critical foundation for planning and implementing future development agendas. The success of these efforts can be evaluated through economic growth indicators. Generally, economic growth refers to continuous changes in the economy toward a better state (Ministry of Finance, 2018).

Infrastructure development plays a pivotal role in accelerating progress at both the national and regional levels. Infrastructure functions as a core driver of economic growth, and the level of economic and investment performance in a country or region is heavily influenced by the availability of adequate infrastructure such as transportation facilities, telecommunications networks, sanitation facilities, and energy supply. Thus, infrastructure serves as the foundation for achieving sustainable economic growth.

In the context of Bali Province, disparities in infrastructure development hinder regional economic growth. Southern Bali, for instance, enjoys relatively advanced infrastructure such as toll roads and airports, making it more attractive to investors. Conversely, traffic congestion caused by a mismatch between vehicle volume and road capacity along with widespread road damage, exacerbates economic inefficiencies. To address this imbalance, the provincial government is developing a major road network connecting the southern, northern, and eastern parts of Bali, with the aim of promoting a more equitable distribution of income across the island.

Adequate infrastructure is a key factor in driving economic growth. To accelerate sustainable development, infrastructure provision can follow two main approaches: the demand-based approach and the supply-based approach. The prioritization of infrastructure projects is closely linked to a country's fiscal capacity. When the budget is limited, development focuses on urgent needs; when economic conditions improve, efforts can shift toward fostering further growth. In this sense, infrastructure operates as a primary engine of economic activity.

Global initiatives such as the Sustainable Development Goals (SDGs) also underscore the importance of infrastructure particularly clean energy as a foundation for inclusive and sustainable economic growth (Saudi et al., 2024). Among various types of infrastructure, road networks facilitate regional mobility and expedite the distribution of goods and services, while electricity supply plays a crucial role in expanding production capacity across household and industrial sectors. As a final form of energy, electricity infrastructure supports a broad range of economic activities aimed at improving public welfare (Simanjuntak, 2015).

Economic growth is defined as the process of structural change within a country's economy toward better conditions over a certain period, which can occur across multiple sectors and reflect improved national production capacity (Gwijangge et al., 2018). Infrastructure development drives this process by enabling greater production capacity and higher future income. When communities have adequate access to basic facilities, they can engage more productively in economic activities, increase the output of goods and services, and ultimately contribute to national economic growth. Furthermore, infrastructure also plays a role in reducing poverty through enhanced access and connectivity (Pornomo et al., 2021).

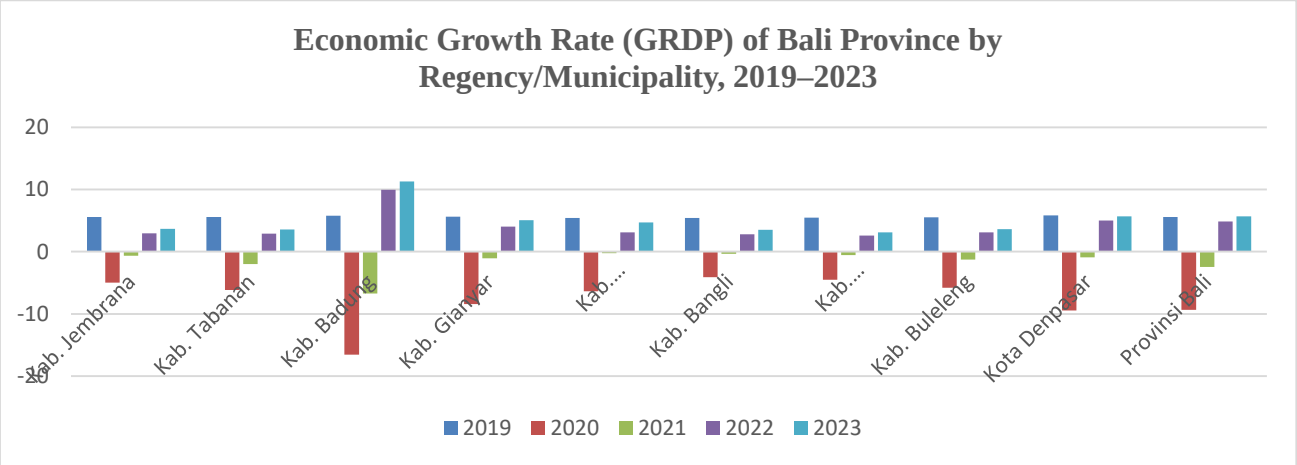
Economic growth significantly influences income distribution, expenditure patterns, and overall output increases. Increases in goods and services production are reflected in aggregate output, typically measured through Gross Regional Domestic Product (GRDP). Consequently, GRDP is frequently used as a primary indicator for assessing a region's economic growth (Afiftah et al., 2019). According to Todaro and Smith (2016), national welfare and economic growth can be evaluated using Gross Domestic Product (GDP), while regional economic growth is measured through GRDP. Thus, a region's development success can be assessed by its economic growth performance.

The pace of regional economic growth is shaped by contributions from various sectors, indirectly reflecting the dynamics and structural shifts within the local economy. As an indicator, economic growth is essential for evaluating the outcomes of development policies and serves as a guide for future planning. In the context of climate change, negative impacts on economic growth can worsen cyclical unemployment and potentially widen regional economic disparities. Such inequalities are often exacerbated by inadequate infrastructure, which can slow the pace of economic recovery (Yunus et al., 2024).

In Bali Province, GRDP values across its nine regencies and municipalities reveal significant disparities: some regions contribute dominantly, while others lag far behind. This reflects the uneven distribution of development across the province. In line with the World Bank's Indonesia's Rising Divide (2015) report, economic inequality in Indonesia including Bali is largely driven by disparities in access to opportunities and basic services such as education, healthcare, and public infrastructure (roads, clean water, sanitation, and electricity).

A study by Sonia Pratiwi and Mike Triani (2019) titled Analysis of the Effect of Economic Infrastructure and Wages on Foreign Direct Investment in Sumatra Island yielded several conclusions: (1) road infrastructure has no significant effect on Foreign Direct Investment (FDI) in Sumatra Island; (2) electricity infrastructure significantly affects FDI in the region; (3) telecommunications infrastructure also has an effect on FDI; (4) wages have no significant effect on FDI; and (5) collectively, road, electricity, telecommunications infrastructure, and wages jointly influence FDI in Sumatra.

Figure 1. Graph of Economic Growth Rate in Bali Province 2019 – 2023



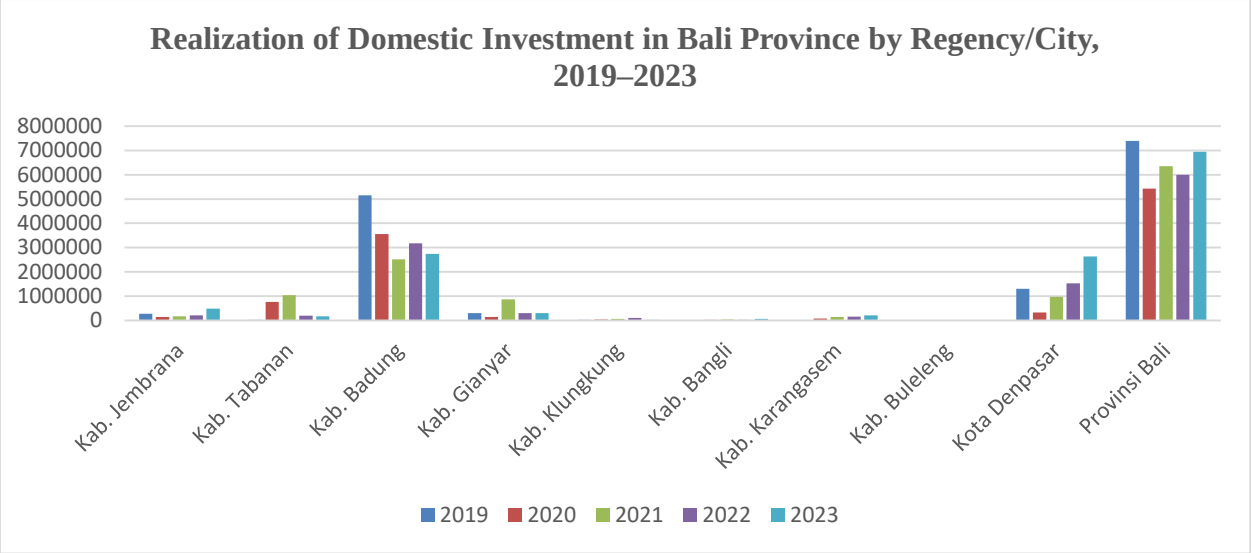
Source: BPS Bali Province, 2025 (processed)

Bali Province experienced a sharp decline in economic growth in 2020 as a direct impact of the COVID-19 pandemic, with Badung Regency being the hardest-hit area, recording a contraction of -16.55 percent. However, since 2021, all regencies/cities have begun to show signs of recovery, although some areas continue to record negative growth.

Badung Regency recorded the fastest economic recovery, with growth reaching 9.97 percent in 2022 and rising further to 11.29 percent in 2023, reaffirming the tourism sector's vital role as a driving force of the regional economy. Denpasar City also showed a significant recovery trend, with growth of 5.69 percent in 2023. Overall, Bali's economy is showing positive signs post-pandemic, although its recovery rate has not yet fully reached pre-2020 levels.

In terms of investment, Bali Province shows promising potential in attracting investors. This is reflected in the total investment achieved in 2023, which reached IDR 28.10 billion, with a contribution of IDR 17.99 billion from Foreign Direct Investment (PMA). This achievement places Bali in the top six nationally in the category of provinces with the highest investment value in Indonesia.

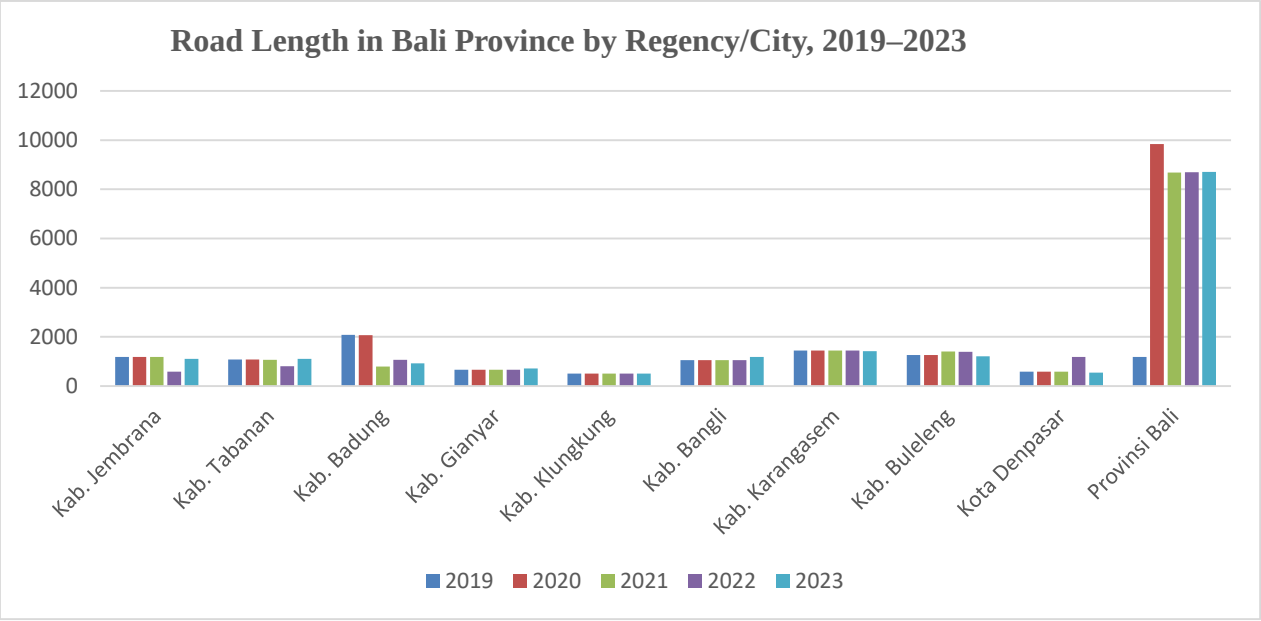
Figure 2. Graph of Domestic Investment Development in Bali Province 2019 – 2023



Source: BPS Bali Province Year (2019 – 2023)

Based on the data presented in Graph 2, the development of Domestic Investment (PMDN) across all regencies and cities in Bali Province can be seen from 2019 to 2023. In 2019, the value of PMDN was recorded at IDR 7,393,172 million. However, in 2020, there was a significant decline to IDR 5,432,674 million. Furthermore, in 2021, the value of PMDN increased again to IDR 6,355,249 million. In 2022, there was a decline again to IDR 6,002,103 million, before finally increasing again in 2023 to IDR 6,950,785 million.

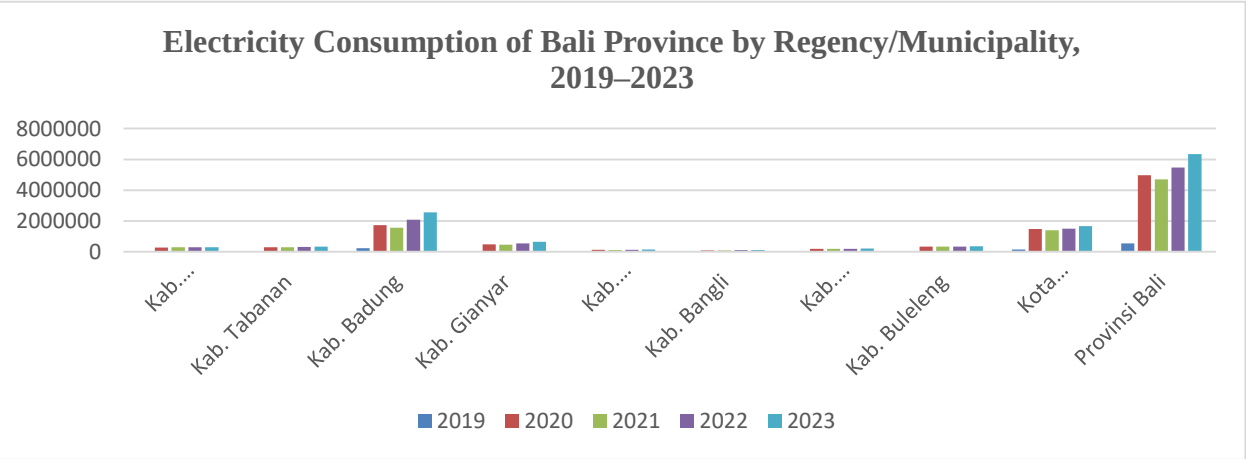
Figure 3. Total Road Length by Regency/City and Status in Bali 2019-2023



Source: BPS Bali Province, 2025 (processed).

Figure 3 presents data on road length in each district/city in Bali Province, indicating fluctuations over the observation period. Karangasem Regency was recorded as having the longest total road length compared to the other eight districts/cities in the province. In 2019, the total road length in Bali Province reached 9,836 kilometers, but by 2023, this had decreased to 8,703 kilometers. Overall, despite some fluctuations, the data in the figure indicates that road length in Bali Province has tended to increase over the past five years.

Figure 4. Total Electricity Consumption by Regency/City and Status in Bali 2019 – 2023



Source: BPS Bali Province, 2025 (processed).

Figure 4 illustrates the trend in electricity consumption across all regencies and municipalities in Bali Province during the 2019–2023 period. In 2019, electricity consumption was recorded at 535,718 megawatts. A significant surge occurred in 2020, when consumption rose to 4,963,632 megawatts. However, in 2021, there was a slight decline to 4,708,017 megawatts. Consumption rebounded in 2022, reaching 5,470,511 megawatts, and continued to grow in 2023, peaking at 6,354,530 megawatts.

Electricity is one of the fundamental infrastructure components that exerts a substantial, positive, and significant influence on economic growth. Adequate electricity availability attracts investors to commit capital, as it plays a crucial role in enhancing production process efficiency. Accordingly, this study seeks to examine the extent to which infrastructure specifically road networks and electricity consumption significantly affects economic output, as represented by investment and economic growth variables.

METHOD

This study employs a quantitative approach with an associative research design, aiming to analyze the impact of road infrastructure and electricity consumption on investment and economic growth in the nine regencies/municipalities of Bali Province during the 2019–2023 period. The data used are secondary, sourced from the Central Bureau of Statistics (BPS), comprising road length, electricity consumption, realized investment, and gross regional domestic product (GRDP) at constant prices. Panel data regression analysis is applied to test causal relationships among variables, with data processing performed using EViews software (Sugiyono, 2018).

The study variables consist of independent variables (road infrastructure and electricity consumption), dependent variables (investment and economic growth), and a mediating variable (investment). Road infrastructure is measured by the total length of national, provincial, and regency/municipal roads in good or fair condition, while electricity consumption is measured by total electricity usage (MWh) across various sectors. Investment is measured by the value of foreign and domestic direct investment (in Indonesian Rupiah), and economic growth is measured by GRDP at constant prices. Operational definitions are formulated to avoid misinterpretation and ensure measurement accuracy (Todaro, 2003; BPS, 2024).

Data analysis follows several stages: stationarity testing, panel data model estimation (common effect, fixed effect, and random effect), and model selection using the Chow test, Hausman test, and Lagrange Multiplier test. Hypothesis testing is then conducted to identify direct and indirect effects among variables, with the Sobel test employed to assess the mediating effect of investment in the relationship between road infrastructure, electricity consumption, and economic growth. This approach is expected to provide empirical insights into the contribution of infrastructure and energy to regional economic development (Savitri et al., 2021; Susilo & Fatmawati, 2024).

RESULTS AND DISCUSSION

Panel Data Regression Analysis Model Estimation Results

The following presents the results of the panel data regression model estimation using the Fixed Effect Model (FEM) approach for the first structure, namely the analysis of the influence of Road Infrastructure (X1) and Electricity Consumption (X2) on Investment (Y1) and Economic Growth (Y2) in Bali Province. The selection of the fixed effect model is based on the results of the previous Breusch-Pagan Lagrange Multiplier (LM) Test which showed that this model is more appropriate to use. The estimation was carried out using the EViews application, and the complete results can be seen in Table 1 below.

Structure 1: Impact on Investment (Y1)

Table 1. Estimation Results of Fixed Effect Structure 1

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	**t-Statistic**	**Prob.**
	B	**Std. Error**	**B**		
C	2703483.0	639502.55		4.2275	0.0168
X1	862.4297	294.1489	0.2990	2.9319	0.0005
X2	-0.2903	0.1983	-0.1612	-1.4638	0.1524

Source: Data attached to the author's thesis, 2025

Based on equation (3.1):

Y_{it1}= + + $\mu\beta_1 X_{it1}$ $\beta_2 X_{it2i}$+ e_{it1}

Y_{it1}= 0.2990 – 0.1612 + $\mu X_{it1} X_{it2i}$+ e_{it1}

Sb = (294.1489) (0.1983)

t = (2.9319) (-1.4638)

R Square = 0.8988

df = 45

F = 30.18

The results of the first structural model estimation (investment) indicate that the regression constant of 2,703,483.0 represents the baseline level of investment when all independent variables are equal to zero. This coefficient is statistically significant (t-statistic = 4.2275, $p < 0.05$).

Based on the results presented in Table 1, road infrastructure (X_1) has a standardized coefficient (Beta) of **0.2990** with a probability value of 0.0005 ($p < 0.05$), indicating a positive and statistically significant effect on investment in Bali Province. In contrast, electricity consumption (X_2) has a standardized coefficient (Beta) of **–0.1612** with a probability value of 0.1524 ($p > 0.05$), showing that electricity consumption does not have a statistically significant effect on investment in Bali Province.

The analysis of the investment equation (Y_1) highlights that road infrastructure (X_1) exerts a positive and significant impact, underscoring the importance of improving road networks. Conversely, electricity consumption (X_2) exhibits a negative but statistically insignificant relationship, suggesting that increases in electricity consumption do not necessarily lead to higher investment. This finding is attributed to Bali's persistent economic inequality, which adversely affects electricity consumption due to limited purchasing power among low-income households, unequal access to energy infrastructure, and uneven investment in the electricity sector.

According to Bank Indonesia, regional economic inequality in Bali remains relatively high, particularly between the Sarbagita area (Badung, Denpasar, Gianyar, and Tabanan) and other regions. By the end of 2024, the interregional inequality index stood at **0.5**, exceeding the ideal threshold of 0.4. Low-income groups typically have lower electricity consumption as their spending priorities focus on basic necessities. Regions with high poverty rates often face challenges in accessing reliable electricity supply. Furthermore, investment in Bali's energy sector tends to be concentrated in economically advanced areas, which exacerbates the disparity in electricity consumption between regions. Previous studies have similarly found that under conditions of high economic inequality, national electricity consumption tends to stagnate or decline, even when economic growth continues (Dogan et al., 2018; Shahbaz et al., 2017; Wang, Su, & Li, 2021).

The explanatory power of this model is strong, with an R-squared value of **0.8988**, meaning that 89.88% of the variation in investment can be explained by the two independent variables in the model.

The subsequent analysis presents the results of the second structural model, which examines the impact of road infrastructure (X_1), electricity consumption (X_2), and investment (Y_1) on economic growth (Y_2) in Bali Province. The Fixed Effect Model (FEM) was selected based on previous model selection tests, which indicated that FEM provides the most appropriate estimation compared to alternative models. Estimations were conducted using EViews software, with the results presented in Table 2.

Table 2. Estimation Results of Fixed Effect Structure 2

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	**t-Statistic**	**Prob.**
	B	**Std. Error**	**B**		
C	3.27400	0.722000		4,533	0.0001
X1	0.00003	0.000004	0.072	0.723	0.475
X2	-0.00004	0.000005	-0.043	-0.828	0.413
Y1	0.00002	0.000005	0.031	0.444	0.659

Source: Data attached to the author's thesis, 2025

Based on equation (3.2):

Y_{it2}= ++ + $\mu\beta_4 X_{it1}$ $\beta_5 X_{it2}$ $\beta_6 Y_{it1i}$+ e_{it1}

Y_{it2}= 0.000003 – 0.0000004 + 0.00002 + $\mu X_{it1} X_{it2} Y_{it1i}$+$e_{it1}$

Sb = (0.0000004)(0.0000005)(0.0000005)

t = (0.723) (-0.828) (0.444)

R Square = 0.1353

df = 45
F = 0.4696

Based on the estimation results of the Fixed Effect model in Structure 2, interesting findings were obtained regarding the factors influencing economic growth. This model demonstrated very high explanatory power with an R-squared value of 0.1353, meaning 13.53 percent of the variation in economic growth can be explained by the independent variables in the model. The very large F-statistic value (0.4696) and significant at the 1 percent level indicate that the model is highly significant overall.

Based on the test results in Table 2, it can be explained that the road infrastructure variable with a Standardized Coefficients Beta value of 0.072 with a probability of 0.723 > 0.05 indicates that the road variable has a negative and insignificant effect on economic growth in Bali Province.

The electricity consumption variable with a Standardized Coefficients Beta value of -0.043 with a probability of 0.413 > 0.05 indicates that the electricity variable has a negative and insignificant effect on economic growth in Bali Province.

The investment variable with a Standardized Coefficients Beta value of 0.031 with a probability of 0.659 > 0.05 indicates that the investment variable has a negative and insignificant effect on economic growth in Bali Province.

Direct Effect Testing

Based on the results of data analysis using EViews, testing the direct influence between variables in this study revealed mixed findings. These results are presented in Table 3.

Table 3. Direct Influence

Variables	Coefficient	p-value	Decision	Information
X1 Y1→	0.2990	0.0005	Significant	According to the hypothesis
X2 Y1 →	-0.1612	0.1524	Not Significant	Contrary to the hypothesis
X1 Y2→	0.072	0.475	Not Significant	Contrary to the hypothesis
X2 Y2→	-0.043	0.413	Not Significant	Contrary to the hypothesis
Y1 Y2→	0.000002	0.659	Not significant	There is no effect and it is contrary to the hypothesis.

Source: Eviews (processed), 2025

Direct Effect of Road Infrastructure (X1) on Investment (Y1) in Bali Province

The coefficient of 0.2990 (p = 0.0005) indicates a positive and significant relationship, consistent with Wagner's theory of infrastructure as capital for economic growth. According to Wagner (1893), infrastructure such as road networks serves as social overhead capital that enhances productivity while reducing transaction costs. Adequate road access can lower the distribution costs of goods and

services, improve production efficiency, and ultimately attract investors by increasing the marginal returns on their investments.

These findings are supported by previous studies, including those by Muttaqim (2018) and Mahyoga & Budhi (2022), which concluded that road infrastructure has a positive correlation with increased investment. This implies that the better the condition of road infrastructure, the greater the potential for investment growth in the region.

Direct Effect of Electricity Consumption (X2) on Investment (Y1) in Bali Province

The negative coefficient of –0.1612 (p = 0.1524) supports the perspective of the Aggregate Demand and Investment Supply Model within the Keynesian approach. According to John Maynard Keynes (1936), investment depends heavily on the expected net returns, or marginal efficiency of capital, which is influenced by input costs, including electricity tariffs and availability. When electricity costs rise or the stability of supply is at risk, the expected returns decrease, leading investors to postpone or reduce their investment activities.

In Bali, where the economy is dominated by the tourism sector, high electricity consumption costs can increase the operational expenses of hotels and other tourism-related industries, thereby compressing profit margins and reducing investment attractiveness. This pressure was exacerbated by the COVID-19 pandemic. Since the emergence of the coronavirus in Indonesia in March 2020 and the enforcement of Government Regulation No. 21 of 2020 on Large-Scale Social Restrictions (Yuliawan & Wanniatie, 2021), there has been a significant decline in social and economic activity, particularly in business and industrial sectors. This led to reduced electricity consumption in 2020 (Faza & Navastara, 2022), reflecting the pandemic's extensive impact on economic activity and public life.

Declines in electricity consumption also demonstrate sensitivity to price and supply factors. For instance, Nilman & Mintargo (2020) found that electricity tariff increases significantly reduced household energy demand in Bengkulu City. Similarly, studies by Muttaqim (2018), Widhiarta & Yudistira (2019), Sari & Prasetya (2020), and Mahyoga & Budhi (2022) confirmed that while higher electricity consumption often shows a negative relationship with investment, the relationship is statistically insignificant (p > 0.05). This indicates that electricity consumption growth without adequate supply capacity and supportive policy frameworks can become a constraint to investment growth.

Direct Effect of Investment (Y1) on Economic Growth (Y2) in Bali Province

The positive coefficient of 0.000002 (p = 0.659) suggests that the relationship between investment and economic growth in Bali Province is statistically insignificant. This finding contrasts with the Harrod–Domar growth model (1939–

1946), which posits that the rate of output growth depends on the savings rate and the efficiency of capital use (capital–output ratio). In theory, higher investment should lead to greater potential output growth, as it expands production capacity through capital accumulation. The discrepancy between empirical results and theory may stem from factors such as inefficient investment allocation, insufficient supporting infrastructure, or imbalanced investment distribution across regions in Bali.

Several empirical studies Muttaqim (2018), Widhiarta & Yudistira (2019), Suryanto & Harjanti (2020), and Mahyoga & Budhi (2022) also indicate that although the relationship between investment and economic growth tends to be positive, its strength is relatively weak and statistical significance decreases, particularly when infrastructure or tourism sector variables are included as controls.

Direct Effect of Road Infrastructure (X1) on Economic Growth (Y2) in Bali Province

The coefficient of 0.072 (p = 0.475) indicates a positive but statistically insignificant effect. This aligns with the Keynesian theory of aggregate investment demand, which views government investment in infrastructure as a component of aggregate demand that can generate multiplier effects in the economy. Ideally, adequate road infrastructure reduces production costs (including the Consumer Price Index), increases real output, and stimulates economic growth in the short to medium term. However, constraints such as spatial planning limitations, bureaucratic delays, or inadequate maintenance can diminish its potential impact.
This finding is consistent with studies by Muttaqim (2018), Widhiarta & Yudistira (2019), Suryanto & Harjanti (2020), and Mahyoga & Budhi (2022), which noted that although road infrastructure generally has a positive effect on the economy, statistical significance is often lacking at the provincial or district level, especially in tourism-dependent regions like Bali. This is partly because road development is often concentrated on improving access to tourist destinations rather than enhancing production corridors or inter-regional economic connectivity, thereby limiting the multiplier effect on the Gross Regional Domestic Product (GRDP) outside the tourism sector.

Direct Effect of Electricity Consumption (X2) on Economic Growth (Y2) in Bali Province

The small negative coefficient of –0.043 (p = 0.413) contradicts the initial hypothesis and Wagner's (1893) social overhead capital theory, which posits that infrastructure, including electricity, supports production activities and reduces operational costs. Ideally, higher electricity consumption reflects increased economic activity, contributing to aggregate growth. However, in certain contexts, rising electricity consumption without matching supply capacity reflects demand–supply

imbalances, which may lead to risks such as power outages or tariff hikes, thereby lowering expected returns and inhibiting broader economic activity. Previous studies Widhiarta & Yudistira (2019), Sari & Prasetya (2020), and Suryanto & Harjanti (2020) have found that electricity consumption can have a negative relationship with economic growth. Widhiarta & Yudistira (2019) attributed this to transmission bottlenecks that raise production costs, thereby reducing industrial and service sector output. Their findings indicated that electricity consumption intensity per capita often had an estimated coefficient $\beta \approx -0.12$, with p-values above 0.10, suggesting statistical insignificance.

Mediation Analysis Using the Sobel Test

To examine whether Investment (Y1) mediates the relationship between Road Infrastructure (X1) and Electricity Consumption (X2) on Economic Growth (Y2), a Sobel test was conducted. The results are presented in Table 4.

Table 4. Indirect Effects

Relationship between variables	Mediating Variables	Z	p-value	Information
X1 Y2→	Y1	2.3647	> 0.05	There is Mediation
X2 Y2→	Y1	-9.1800	> 0.05	No Mediation

Source: Eviews (processed)

Direct Effect Testing was conducted to determine the direct influence of Road Infrastructure (X1) and Electricity Consumption (X2) on Investment (Y1) and Economic Growth (Y2) in the regencies/municipalities of Bali Province.

Here's your text translated into formal, academically appropriate English with proper scholarly structure and clarity:

Mediation Test of the Investment Variable (Y_1) on the Relationship between Road Infrastructure (X_1) and Economic Growth (Y_2) in Bali Province

Hypothesis Formulation

- **H_0**: Investment (Y_1) does not mediate the effect of Road Infrastructure (X_1) on Economic Growth (Y_2) in the regencies/municipalities of Bali Province.
- **H_1**: Investment (Y_1) mediates the effect of Road Infrastructure (X_1) on Economic Growth (Y_2) in Bali Province.

Significance Level

At $\alpha = 5\%$ (0.05), the critical value of Z (Z-table) is 1.96.

Testing Criteria

- If *p*-value ≥ 0.05 or Z_calculated ≤ Z_table, then H_0 is accepted, indicating that Investment (Y_1) is **not** a mediating variable.

- If *p*-value < 0.05 or Z_calculated > Z_table, then H_0 is rejected, indicating that Investment (Y_1) **is** a mediating variable.

Computation

$$z = \frac{ab}{\sqrt{(b^2SE_a^2) + (a^2SE_b^2)}}$$

$$z = \frac{(862.4297) \times (0.00002)}{\sqrt{(862.4297)^2 \times (0.000005)^2 + (0.00002)^2 \times (294.1489)^2}}$$

$$z = \frac{0.017248594}{0.00729411064} = 2.36472886844 \quad (p > 0{,}05$$

Conclusion

Since Z_calculated = 2.36 > 1.96, H_0 is rejected. This indicates that Investment (Y_1) acts as a mediating variable between Road Infrastructure (X_1) and Economic Growth (Y_2) in Bali Province. In other words, road infrastructure indirectly affects economic growth through investment in Bali Province.

Mediation Test of the Investment Variable (Y_1) on the Relationship between Electricity Consumption (X_2) and Economic Growth (Y_2) in Bali Province

Hypothesis Formulation

- **H_0**: Investment (Y_1) does not mediate the effect of Electricity Consumption (X_2) on Economic Growth (Y_2) in Bali Province.
- **H_1**: Investment (Y_1) mediates the effect of Electricity Consumption (X_2) on Economic Growth (Y_2) in Bali Province.

Significance Level

At α = 5% (0.05), the critical value of Z (Z-table) is 1.96.

Testing Criteria

- If *p*-value ≥ 0.05 or Z_calculated ≤ Z_table, then H_0 is accepted, indicating that Investment (Y_1) is **not** a mediating variable.
- If *p*-value < 0.05 or Z_calculated > Z_table, then H_0 is rejected, indicating that Investment (Y_1) **is** a mediating variable.

Computation

$$z = \frac{ab}{\sqrt{(b^2SE_a^2) + (a^2SE_b^2)}}$$

$$z = \frac{(-0.2903) \times (0.000005)}{\sqrt{(-0.2903)^2 \times (0.000005)^2 + (0.00002)^2 \times (0.1983)^2}}$$

$$z = \frac{-0.00005806}{0.00000632456} = -9.1800852549 \quad (p > 0{,}05)$$

Conclusion

Since Z_calculated = –9.18 < 1.96, H_0 is accepted. This means that Investment (Y_1) is not a mediating variable between Electricity Consumption (X_2) and Economic Growth (Y_2) in Bali Province. In other words, there is no indirect effect of electricity consumption on economic growth through investment in Bali Province.

The Sobel test results indicate that Investment (Y_1) is a significant mediator only in the relationship between Road Infrastructure (X_1) and Economic Growth (Y_2).

Furthermore, based on the direct effect analysis, the direct effects appear more dominant. Specifically:

- Road infrastructure has a positive effect on both investment and economic growth.
- Electricity consumption has a negative effect on investment.
- Electricity consumption has a negative but statistically insignificant effect on economic growth.

CONCLUSION

1. Road infrastructure has a significant positive effect on investment in Bali Province.
2. Electricity consumption has a negative and statistically insignificant effect on investment.
3. Investment does not significantly affect economic growth, contrary to the hypothesis.
4. Road infrastructure has a positive but insignificant effect on economic growth.
5. Electricity consumption has a negative effect on economic growth, contrary to the hypothesis.
6. There is an indirect effect of road infrastructure on economic growth through investment, whereas electricity consumption has no such indirect effect.

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