Journal of Finance and Business Digital (JFBD)
Vol. 4, No. 4 2025: 1063-1082

# The Impact of Intergovernmental Transfers on Infrastructure Capital Expenditure: The Mediating Role of Fixed Asset Value

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A R T I C L E I N F O

*Keywords:* Intergovernmental Transfers, Infrastructure Capital Expenditure, Fixed Asset Value, Path Analysis, Fiscal Decentralization

*Received : 20, October*
*Revised : 22, November*
*Accepted: 24, December*



A B S T R A C T

This study examines the complex relationship between intergovernmental transfers and infrastructure capital expenditure, incorporating fixed asset value as a mediating variable. Diverging from traditional approaches that posit a direct relationship between fiscal transfers and capital spending, we employ path analysis to uncover indirect mechanisms operating through asset accumulation and valuation. Drawing on empirical evidence from 23 districts/municipalities in Aceh Province, Indonesia over the period 2008-2021, our findings reveal that while intergovernmental transfers exert a positive and significant direct effect on infrastructure capital expenditure ($\beta$ = 0.412, $p < 0.001$), the mediating role of fixed asset value proves negative and statistically insignificant (indirect effect = -0.023, $p = 0.284$). These results indicate that infrastructure spending allocation decisions are predominantly driven by the direct availability of transfer funds (explaining 63.64% of variance) rather than by consideration of accumulated asset values.

DOI prefik: https://doi.org/10.55927/jfbd.v4i4.541
ISSN-E: 2964-8688
https://srhformosapublisher.org/index.php/jfbd

## INTRODUCTION

Public infrastructure constitutes a fundamental pillar for economic growth and social welfare enhancement. Within the context of fiscal decentralization, subnational governments assume a strategic role in providing infrastructure that responds to local needs (Kis-Katos & Sjahrir, 2017; Martínez-Vázquez et al., 2017; Lago et al., 2024). Intergovernmental fiscal transfers from central to subnational governments serve as the primary mechanism for financing infrastructure development, given the limited fiscal capacity of local governments to generate own-source revenues (Bardhan & Mookherjee, 2006; Tang et al., 2024). Nevertheless, the effectiveness of fiscal transfers in promoting infrastructure investment does not invariably operate optimally and remains highly contingent upon various institutional and managerial factors at the local level (Crescenzi et al., 2016; Chaponda, 2025).

The empirical literature examining the relationship between fiscal transfers and infrastructure expenditure yields heterogeneous findings. Kappeler et al. (2013) document that fiscal decentralization tends to augment investment in productive infrastructure at the regional level. However, research by Tang et al. (2024) in the Philippines identifies that while intergovernmental transfers enhance household income and reduce poverty, their effects vary substantially depending on the size and development level of local governments. In developing country contexts, Manga Amougou (2025) demonstrates that revenue decentralization exerts a positive and significant impact on local public expenditure, with stronger effects on capital spending relative to operational expenditure. Porto et al. (2025) additionally note that intergovernmental transfers influence dynamic adjustment of subnational budgets, whereby local governments adjust operational and capital spending differentially in response to transfer fluctuations.

An aspect frequently overlooked in the analysis of transfer-infrastructure expenditure relationships concerns the role of fixed assets as a potentially mediating variable. Fixed asset value reflects the accumulation of past infrastructure investments and constitutes an important consideration in new investment planning (Salah & Alsharairi, 2025; Too & Amadi-Echendu, 2010). Within the framework of accrual-based accounting increasingly adopted by subnational governments, asset valuation and recording provide an informational basis for investment decision-making (Caldeira et al., 2015; Costa et al., 2025). However, the relationship between fixed asset value and infrastructure capital expenditure decisions remains insufficiently explored empirically, particularly in developing country subnational government contexts.

## LITERATURE REVIEW

### *Fiscal Transfers and Infrastructure Expenditure*

Intergovernmental transfers constitute a pivotal instrument in fiscal federalism systems for addressing vertical imbalances between central and subnational government fiscal capacities, as well as horizontal imbalances across subnational governments (Boadway, 2001; Yilmaz & Zahir, 2020). In developing country contexts, fiscal transfers become the dominant financing source for subnational governments given the limited local tax base and weak tax administration capacity (Shah, 2007; Lago et al., 2024).

The comprehensive survey by Lago et al. (2024) identifies three primary objectives of intergovernmental transfers: (1) financing subnational public services and investments by filling the vertical fiscal gap; (2) subsidizing services involving inter-jurisdictional spillovers or externalities; and (3) performing equalization to enable subnational governments with varying fiscal capacities to provide equivalent public services. This study documents that unconditional grants generate pure income effects with marginal propensity to spend ranging from 15-20%, while conditional grants prove more effective in enhancing local spending in specific sectors.

The empirical literature on fiscal transfer impacts on local public expenditure demonstrates the phenomenon known as the flypaper effect, whereby each rupiah of central government transfer tends to increase local spending more than equivalent increases in local own-source revenue (Hines & Thaler, 1995). Research by Tang et al. (2024) in the Philippines finds that fiscal transfers increase household per capita income by 9.6% in the long run, with stronger effects in smaller and less developed local governments. These findings confirm that fiscal transfers affect not only spending but also broader development outcomes.

In the Indonesian context, Kis-Katos and Sjahrir (2017) demonstrate that fiscal and political decentralization positively influence local public investment, with stronger effects following direct local leader elections. This study documents that fiscal decentralization impacts on infrastructure investment vary depending on regional characteristics, with areas possessing better administrative capacity exhibiting higher investment responses to fiscal transfers.

The comparative study by Ogweno and Semedo (2025) across 33 developing countries reveals that expenditure decentralization correlates positively with central government fiscal balance, though this effect diminishes when subnational government dependence on transfers increases. These findings indicate the presence of soft budget constraints whereby local governments heavily dependent on transfers tend toward less disciplined fiscal management. Porto et al. (2025) add that intergovernmental transfers influence dynamic adjustment of subnational budgets, with local governments adjusting operational and capital spending differentially in response to transfer changes.

Regarding infrastructure expenditure specifically, Manga Amougou (2025) finds that expenditure decentralization exerts stronger effects on capital spending relative to operational spending, indicating that fiscal autonomy encourages local governments to focus more on productive investment. This research employs data from 213 local and regional governments in Cameroon during 2010-2020, documenting that revenue decentralization increases overall local public spending with higher elasticity for capital expenditure.

Nevertheless, the relationship between fiscal transfers and infrastructure expenditure does not invariably operate linearly. Research by Ardanaz et al. (2022) documents that capital expenditure tends toward procyclicality in developing countries, increasing during favorable economic conditions and declining drastically during crises. This study analyzes data from developing countries, finding that current expenditure upswings occur during favorable economic periods while capital expenditure downswings occur during adverse times. Foster et al. (2022) identify that on-budget infrastructure spending in developing countries remains relatively low (approximately 1% of GDP) and declined by roughly one-third during 2010-2018, with the road sector bearing the largest burden of reductions. These findings indicate that despite available fiscal transfers, infrastructure investment allocations often prove inadequate and remain vulnerable to cuts during periods of heightened fiscal pressure.

Miyazaki (2020) employs regression discontinuity design to analyze fiscal transfer effects on local government tax effort in Japan. This study documents that equalization transfers reduce local government incentives to increase own-tax revenues, which in turn can affect fiscal capacity for infrastructure investment. These findings confirm the existence of fiscal disincentives from excessive transfers, consistent with soft budget constraint theory.

***Public Sector Fixed Asset Management***

Fixed asset management in the public sector has undergone significant transformation with the adoption of accrual-based accounting. Salah and Alsharairi (2025) explain that the evolution of accounting and non-financial asset management in governments are closely interrelated, whereby accrual accounting reforms and property asset management can yield practical benefits when implemented simultaneously. Inventorization and valuation conducted for accrual accounting purposes can also be utilized for asset management objectives, and vice versa. However, in practice, these two systems often operate separately and remain poorly integrated.

Too and Amadi-Echendu (2010) develop a strategic framework for infrastructure asset management identifying core processes: strategic asset planning, condition assessment, work programming, service delivery, and performance management. This framework emphasizes a life-cycle approach in asset management, whereby new investment decisions must consider operational and maintenance costs over the asset's lifetime. Costa et al. (2025) add that capital investment planning in water sector infrastructure assets should be efficiency-based, integrating information on asset condition, demand projections, and budget constraints.

In infrastructure investment planning contexts, accurate fixed asset value information becomes crucial. Randolph et al. (1996) identify that existing infrastructure asset valuation influences new spending allocation decisions, with regional governments possessing larger infrastructure stocks tending to allocate less to new investment and focusing more on maintenance. Agénor (2005) develops a theoretical model demonstrating that optimal allocation between new infrastructure investment and maintenance depends upon the depreciation rate and efficiency of existing public capital.

Empirical studies examining the relationship between fixed asset value and infrastructure capital expenditure remain limited. Most research focuses on infrastructure stock impacts on economic growth (Bom & Ligthart, 2014) but rarely analyzes how asset value information influences new infrastructure investment decisions. Research by Kessides (1996) identifies that adequate infrastructure stock can reduce marginal investment requirements, while also emphasizing maintenance importance for sustaining existing infrastructure productivity. Chaponda (2025) in reviewing effective spending on public infrastructure emphasizes that governments must strengthen infrastructure governance through holistic approaches, including enhanced rigour in project appraisal and selection, effective capital budgeting, and regular maintenance spending. Schwartz et al. (2020) add that maintaining and managing public infrastructure assets requires comprehensive asset information systems integrated with planning and budgeting processes.

In modern public financial management systems, fixed asset values are reported in government balance sheets and serve as fiscal accountability indicators. However, asset information utilization for investment planning continues to face various constraints, including inconsistent asset data quality, lack of integration between accounting and planning systems, and limited analytical capacity at subnational government levels (World Bank, 2020). These conditions cause asset value information to often receive suboptimal consideration in budgeting and infrastructure investment planning processes.Casalini et al. (2025) in analyzing financing infrastructure with public-private partnerships demonstrate that effective infrastructure asset management requires sound understanding of risk allocation and financial mechanisms supporting investment sustainability. In PPP contexts, asset value information becomes crucial for determining value for money and optimally allocating risks between public and private sectors.

### *Mediation Analysis in Fiscal Research*

Mediation analysis constitutes a statistical approach enabling researchers to identify and test mechanisms or pathways through which independent variables influence dependent variables (Hayes, 2018). In fiscal and public policy research contexts, mediation analysis proves highly relevant for understanding how policy interventions generate effects through specific mechanisms (Celli, 2022). Jollineau and Bowen (2023) explain that path analysis for mediation involves three primary components: (1) total effect, representing the overall influence of the independent variable on the dependent variable; (2) direct effect,

representing the independent variable's influence on the dependent variable after controlling for the mediator variable; and (3) indirect effect, representing the independent variable's influence on the dependent variable as mediated by the mediator variable. Within the path analysis framework, total effect equals the sum of direct and indirect effects.

Several important assumptions in mediation analysis require fulfillment to ensure causal inference validity (Celli, 2022). The first assumption posits no confounding between treatment-outcome, treatment-mediator, and mediator-outcome relationships. The second assumption stipulates no confounders influenced by treatment while simultaneously affecting the mediator-outcome relationship. In practice, these assumptions prove challenging to satisfy completely, necessitating researcher identification and control of potential confounding variables.

In fiscal literature, several studies have employed mediation analysis to explore policy impact mechanisms. For instance, Triyono et al. (2022) utilize economic growth as a mediator variable in analyzing the relationship between fiscal decentralization and regional income inequality. Huber et al. (2017) investigate whether employment effects of labor market programs are mediated by placement in training programs. However, mediation analysis applications in the context of fiscal transfer, fixed asset, and infrastructure expenditure relationships remain limited.

***Research Gaps***

Despite an extensive literature on fiscal transfers and infrastructure expenditure, several gaps motivate this research. First, most studies focus on direct relationships between fiscal transfers and infrastructure expenditure without exploring potential indirect mechanisms mediating these relationships. Second, the role of fixed asset information in infrastructure investment decision-making processes has not received adequate attention in empirical literature. Third, mediation analysis applications in subnational government fiscal contexts remain limited, particularly in developing countries like Indonesia. This research attempts to fill these gaps by integrating asset management perspectives into fiscal transfer-infrastructure expenditure relationship analysis. Path analysis utilization enables identification not only of fiscal transfer direct effects on infrastructure expenditure but also indirect effects mediated by fixed asset value. In Indonesian subnational government contexts that have implemented accrual-based accounting, this research provides insights regarding the extent to which fixed asset information receives consideration in infrastructure expenditure allocation decisions.

## METHODOLOGY

### *Conceptual Framework*

The conceptual framework of this study is grounded in a path analysis model linking three principal variables: intergovernmental transfers (X), fixed asset value (M), and infrastructure capital expenditure (Y). This model assumes that intergovernmental transfers can influence infrastructure capital expenditure through two pathways: a direct path and an indirect path through fixed asset value as mediator (indirect path via M). The direct path indicates that transfer fund availability enables subnational governments to allocate larger budgets for new infrastructure investment. This aligns with fiscal decentralization theory emphasizing that central government transfers aim to enhance regional fiscal capacity in providing public services, including infrastructure (Oates, 1972; Shah, 2007; Lago et al., 2024). In this context, greater received transfer funds translate into greater capacity for financing infrastructure projects.

The indirect path through fixed asset value indicates a more complex mechanism. In this pathway, transfer funds influence fixed asset accumulation through past infrastructure investments, and the accumulated fixed asset value subsequently influences infrastructure capital expenditure allocation decisions in subsequent periods. Two possible influence directions exist in this pathway. First, high fixed asset value may increase infrastructure capital expenditure as regional governments need to allocate budgets for maintaining and enhancing existing infrastructure capacity (Agénor, 2005). Second, high fixed asset value may reduce infrastructure capital expenditure as regional governments consider existing infrastructure stock already adequate, thus not requiring significant new investment (Randolph et al., 1996).

### Data and Sample

This research employs panel data from 23 districts/municipalities in Aceh Province for the period 2008-2021, yielding 322 observations (23 × 14 years). The selection of this period is based on several considerations. First, this period encompasses the implementation phase of accrual-based accounting in Indonesian regional governments, which commenced following the issuance of Government Regulation No. 71/2010 on Government Accounting Standards. Second, this period is sufficiently long to observe dynamics in inter-variable relationships, including lag effects of infrastructure investment on fixed asset accumulation. Third, data availability remains consistent for all research variables. Data in this study are sourced from Regional Government Financial Statements (LKPD) audited by the Supreme Audit Agency (BPK). LKPD data encompass information on revenue realization (including transfer funds), expenditure realization (including capital expenditure), and fixed asset positions in balance sheets. The utilization of audited LKPD data ensures data quality and credibility. Additional data on demographic and economic characteristics of districts/municipalities are obtained from the Central Statistics Agency (BPS).

## RESEARCH RESULT

### *Descriptive Statistics*

Descriptive statistical analysis provides a general overview of research variable characteristics during the 2008-2021 period. Table 1 presents descriptive statistics for all variables employed in this study.

**Table 1. Descriptive Statistics of Research Variables (N = 322 observations)**

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Infrastructure Capital Expenditure (million Rp) | 145,826 | 89,234 | 8,916 | 708,473 |
| Intergovernmental Transfers (million Rp) | 498,642 | 178,456 | 130,875 | 801,801 |
| Fixed Asset Value (million Rp) | 1,487,293 | 1,182,567 | 14,190 | 5,308,128 |
| Local Own-Source Revenue (million Rp) | 89,352 | 78,945 | 10,763 | 367,232 |
| Other Legitimate Revenue (million Rp) | 124,567 | 85,234 | 19,724 | 322,029 |
| Population (thousand people) | 245 | 152 | 48 | 898 |
| GRDP per capita (million Rp) | 28.5 | 15.8 | 12.3 | 87.6 |

*Source: Processed from LKPD and BPS Data, 2008-2021*

The average intergovernmental transfers received by districts/municipalities in Aceh during 2008-2021 amounts to Rp 498.64 billion with a standard deviation of Rp 178.46 billion. This substantial variation indicates significant differences in transfer allocation across districts/municipalities, primarily attributable to differences in DAU formulae, DAK allocation, and oil and gas production affecting Special Autonomy Funds and DBH.

Infrastructure capital expenditure demonstrates an average of Rp 145.83 billion with a standard deviation of Rp 89.23 billion. The maximum value reaches Rp 708.47 billion, indicating that several regions allocate very large proportions to infrastructure investment. The proportion of infrastructure capital expenditure to total regional spending ranges from 15% to 35%, consistent with Foster et al.'s (2022) findings demonstrating that infrastructure spending in developing countries remains relatively limited.

Fixed asset value demonstrates substantial accumulation with an average of Rp 1,487.29 billion. The maximum value reaches Rp 5,308.13 billion, indicating infrastructure investment consistently implemented throughout the observation period. However, high variation (standard deviation Rp 1,182.57 billion) indicates large differences in infrastructure stock across districts/municipalities.

Table 2 presents a correlation matrix among principal research variables to provide an initial overview of inter-variable relationships.

**Table 2. Correlation Matrix Among Principal Variables**

| Variable | Y | X | M | PAD | OTHER |
|---|---|---|---|---|---|
| Infrastructure Capital Expenditure (Y) | 1.000 | | | | |
| Intergovernmental Transfers (X) | 0.674*** | 1.000 | | | |
| Fixed Asset Value (M) | 0.423*** | 0.587*** | 1.000 | | |
| Local Own-Source Revenue (PAD) | 0.512*** | 0.456*** | 0.389*** | 1.000 | |
| Other Legitimate Revenue (OTHER) | 0.589*** | 0.523*** | 0.412*** | 0.567*** | 1.000 |

*Note: *** $p < 0.01$*

*Source: Processed Data*

The correlation matrix demonstrates that intergovernmental transfers exhibit strong positive correlation with infrastructure capital expenditure ($r = 0.674$, $p < 0.01$). Fixed asset value also correlates positively with infrastructure capital expenditure ($r = 0.423$, $p < 0.01$) and transfers ($r = 0.587$, $p < 0.01$). These positive and significant correlations provide initial indications of consistent inter-variable relationships, although causality direction and magnitude require further testing through regression analysis.

**Diagnostic Test Results**

Prior to main model estimation, a series of diagnostic tests are performed to ensure estimation result validity and reliability. Table 3 presents diagnostic test results encompassing normality, multicollinearity, autocorrelation, and heteroscedasticity tests.

**Table 3. Diagnostic Test Results**

| Test | Statistic | Value | Criterion | Conclusion |
|---|---|---|---|---|
| **Normality** | | | | |
| Shapiro-Wilk (Model 1) | W | 0.9845 | $p > 0.05$ | Normal residuals |
| Shapiro-Wilk (Model 2) | W | 0.9823 | $p > 0.05$ | Normal residuals |
| Skewness (Model 1) | | 0.234 | $\|S\| < 0.5$ | Not skewed |
| Kurtosis (Model 1) | | 2.867 | $2 < K < 4$ | Mesokurtic |
| Skewness (Model 2) | | 0.289 | $\|S\| < 0.5$ | Not skewed |
| Kurtosis (Model 2) | | 2.945 | $2 < K < 4$ | Mesokurtic |
| **Multicollinearity** | | | | |
| VIF Intergovernmental Transfers | | 2.34 | VIF < 10 | No multicollinearity |
| VIF Fixed Asset Value | | 1.89 | VIF < 10 | No multicollinearity |
| VIF PAD | | 2.12 | VIF < 10 | No multicollinearity |
| VIF Other Revenue | | 1.76 | VIF < 10 | No multicollinearity |

| | | | | |
|---|---|---|---|---|
| VIF Population | | 1.45 | VIF < 10 | No multicollinearity |
| VIF GRDP | | 1.92 | VIF < 10 | No multicollinearity |
| **Autocorrelation** | | | | |
| Durbin-Watson (Model 1) | | 1.923 | 1.5 < DW < 2.5 | No autocorrelation |
| Durbin-Watson (Model 2) | | 1.867 | 1.5 < DW < 2.5 | No autocorrelation |
| **Heteroscedasticity** | | | | |
| Breusch-Pagan (Model 1) | $\chi^2$ | 8.234 | p > 0.05 | Homoscedastic |
| Breusch-Pagan (Model 2) | $\chi^2$ | 9.567 | p > 0.05 | Homoscedastic |

*Source: Processed Data*

Normality test results employing Shapiro-Wilk test indicate that residuals from both models are normally distributed (W > 0.98, p > 0.05). Skewness and kurtosis tests also confirm that residuals do not exhibit excessive skewness tendency and possess distributions approaching normality (mesokurtic). Multicollinearity tests employing VIF (Variance Inflation Factor) demonstrate that all independent variables possess VIF below 10, indicating absence of serious multicollinearity problems. The highest VIF value is 2.34 for the intergovernmental transfers variable, still far below the threshold of 10.

Autocorrelation tests employing Durbin-Watson test demonstrate DW values around 1.9 for both models, within acceptable range (1.5 < DW < 2.5). This indicates absence of significant autocorrelation problems in model residuals. Heteroscedasticity tests employing Breusch-Pagan test demonstrate absence of significant heteroscedasticity problems (p > 0.05 for both models). Model residuals possess relatively constant variance, supporting OLS estimation validity.

### *Model Estimation Results*

Table 4 and 5 present estimation results for both structural equations in the path analysis model. Estimation is conducted using fixed effects model with robust standard errors to accommodate potential residual heteroscedasticity and autocorrelation.

**Table 4. Model 1 Estimation Results: Effect of Intergovernmental Transfers on Fixed Asset Value**

| Variable | Coefficient | Std. Error | t-statistic | p-value | 95% CI |
|---|---|---|---|---|---|
| Constant | 3.456 | 1.234 | 2.801 | 0.005** | [1.032, 5.880] |
| ln(Intergovernmental Transfers) | 0.583 | 0.089 | 6.550 | 0.000*** | [0.408, 0.758] |
| ln(PAD) | 0.123 | 0.067 | 1.836 | 0.067 | [-0.009, 0.255] |
| ln(Other Revenue) | 0.089 | 0.056 | 1.589 | 0.113 | [-0.021, 0.199] |

| | | | | | |
|---|---|---|---|---|---|
| ln(Population) | 0.234 | 0.112 | 2.089 | 0.037* | [0.014, 0.454] |
| ln(GRDP per capita) | 0.156 | 0.078 | 2.000 | 0.046* | [0.003, 0.309] |
| $R^2$ Within | 0.5423 | | | | |
| $R^2$ Between | 0.6789 | | | | |
| $R^2$ Overall | 0.6234 | | | | |
| F-statistic | 38.45*** | | | | |
| N observations | 322 | | | | |
| N districts/municipalities | 23 | | | | |

*Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$*

*Source: Processed Data*

Model 1 estimation results demonstrate that intergovernmental transfers exert a positive and highly significant effect on fixed asset value ($\beta_1 = 0.583$, $p < 0.001$). This coefficient indicates that each 1% increase in transfers augments fixed asset value by 0.583%. This finding proves consistent with theory that fiscal transfers constitute the primary financing source for capital investment subsequently accumulating as fixed assets.

Control variables population and GRDP per capita also exert positive and significant effects on fixed asset value, indicating that regions with larger populations and higher economic levels tend to possess greater infrastructure asset accumulation. The overall $R^2$ value of 0.6234 demonstrates that the model can explain approximately 62.34% of variation in fixed asset value.

**Table 5. Model 2 Estimation Results: Effect of Intergovernmental Transfers and Fixed Asset Value on Infrastructure Capital Expenditure**

| **Variable** | **Coefficient** | **Std. Error** | **t-statistic** | **p-value** | **95% CI** |
|---|---|---|---|---|---|
| Constant | 2.789 | 1.456 | 1.916 | 0.056 | [-0.065, 5.643] |
| ln(Intergovernmental Transfers) | 0.412 | 0.094 | 4.383 | 0.000*** | [0.227, 0.597] |
| ln(Fixed Asset Value) | -0.039 | 0.036 | -1.083 | 0.279 | [-0.110, 0.032] |
| ln(PAD) | 0.178 | 0.071 | 2.507 | 0.013* | [0.039, 0.317] |
| ln(Other Revenue) | 0.234 | 0.062 | 3.774 | 0.000*** | [0.112, 0.356] |
| ln(Population) | 0.098 | 0.118 | 0.831 | 0.407 | [-0.133, 0.329] |
| ln(GRDP per capita) | 0.145 | 0.083 | 1.747 | 0.081 | [-0.018, 0.308] |
| $R^2$ Within | 0.6012 | | | | |
| $R^2$ Between | 0.6923 | | | | |
| $R^2$ Overall | 0.6578 | | | | |
| Adjusted $R^2$ | 0.6364 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| F-statistic | 42.78*** | | | | |
| N observations | 322 | | | | |
| N districts/municipalities | 23 | | | | |

*Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$*

*Source: Processed Data*

Model 2 estimation results reveal intriguing findings. Intergovernmental transfers exert a positive and highly significant effect on infrastructure capital expenditure ($\beta_2 = 0.412$, $p < 0.001$), confirming that fiscal transfers constitute principal determinants of infrastructure spending in subnational governments. This coefficient indicates that each 1% increase in transfers augments infrastructure capital expenditure by 0.412%.

However, fixed asset value demonstrates a negative effect on infrastructure capital expenditure, albeit statistically insignificant ($\beta_3 = -0.039$, $p = 0.279$). The negative coefficient sign indicates a tendency for regional governments with higher fixed asset values to allocate less to new infrastructure capital spending, though this effect lacks sufficient strength to achieve statistical significance.

Control variables PAD and Other Legitimate Revenue exert positive and significant effects, indicating that local revenue sources also play important roles in determining infrastructure capital expenditure allocation. The adjusted $R^2$ value of 0.6364 demonstrates that the model can explain approximately 63.64% of variation in infrastructure capital expenditure.

***Mediation Test***

To formally test whether fixed asset value mediates the relationship between transfers and infrastructure capital expenditure, we conduct mediation testing using the bootstrapping method with 5,000 iterations. Table 6 presents mediation effect testing results.

**Table 6. Mediation Test Results: Effect of Intergovernmental Transfers on Infrastructure Capital Expenditure through Fixed Asset Value**

| **Effect** | **Estimate** | **Std. Error** | **z-value** | **p-value** | **95% Bootstrap CI** |
|---|---|---|---|---|---|
| **Direct Effect ($\beta_2$)** | 0.412 | 0.094 | 4.383 | 0.000*** | [0.228, 0.596] |
| **Indirect Effect ($\beta_1 \times \beta_3$)** | -0.023 | 0.021 | -1.095 | 0.273 | [-0.065, 0.019] |
| **Total Effect** | 0.389 | 0.098 | 3.969 | 0.000*** | [0.197, 0.581] |
| **Proportion Mediated** | -5.9% | | | | |
| **Ratio of Indirect to Direct Effect** | -0.056 | | | | |

*Note: *** $p < 0.001$ Confidence intervals calculated using bias-corrected bootstrap method (5,000 iterations)*

*Source: Processed Data*

Mediation test results demonstrate that the indirect effect of intergovernmental transfers on infrastructure capital expenditure through fixed asset value proves negative and statistically insignificant ($\beta_1 \times \beta_3$ = -0.023, p = 0.273). The 95% confidence interval for the indirect effect is [-0.065, 0.019], encompassing zero value, confirming that mediation through fixed asset value does not occur significantly.

The direct effect of transfers on infrastructure capital expenditure remains positive and highly significant ($\beta_2$ = 0.412, p < 0.001), even after controlling for fixed asset value as mediator. The total effect equals 0.389, nearly identical to the direct effect, indicating that the primary pathway of transfer influence on infrastructure capital expenditure operates through the direct pathway rather than through fixed asset value mediation. The negative mediation proportion (-5.9%) indicates that fixed asset value does not constitute an effective mediator in the relationship between transfers and infrastructure capital expenditure. Indeed, if any mediation effect exists, its direction opposes theoretical expectations, whereby higher fixed asset values (influenced by past transfers) slightly reduce (rather than increase) current period infrastructure capital expenditure.

## DISCUSSION

### *Direct Effect of Transfers on Infrastructure Expenditure*

The finding that intergovernmental transfers exert positive and significant effects on infrastructure capital expenditure aligns with most literature on fiscal decentralization (Kis-Katos & Sjahrir, 2017; Manga Amougou, 2025; Tang et al., 2024). In Indonesian regional government contexts, central government transfers constitute the dominant financing source given limited Local Own-Source Revenue (PAD) capacity. This causes expenditure allocation, including for infrastructure, to depend heavily upon transfer fund availability.

The coefficient magnitude ($\beta$ = 0.412) indicates that infrastructure capital expenditure elasticity with respect to transfers remains inelastic, whereby 1% increases in transfers only augment infrastructure capital expenditure by 0.412%. This finding proves consistent with the flypaper effect phenomenon identified by Hines and Thaler (1995) and the comprehensive survey by Lago et al. (2024), whereby transfer funds tend to "stick" to regional government spending, though not entirely allocated to capital expenditure.

The strong influence of transfers on infrastructure expenditure can be explained through several mechanisms. First, adequate transfer fund availability provides fiscal space for regional governments to allocate budgets to productive investment, including infrastructure. Without transfers, most regional government budgets would be exhausted by personnel and operational spending, leaving minimal room for capital investment (Ardanaz et al., 2022; Foster et al., 2022).

Second, certain transfer types, particularly Special Allocation Funds (DAK), possess earmarking or specific allocations for certain sectors, including infrastructure. This ensures that portions of transfer funds are explicitly allocated for infrastructure development. Although DAK constitutes only part of total transfers, its effect on infrastructure spending can prove quite significant due to its specific and tied nature (conditional grants), consistent with Lago et al.'s (2024) findings that conditional grants prove more effective in enhancing sector-specific spending.

Third, in Aceh's context, Special Autonomy Funds provide greater flexibility for regional governments to allocate budgets according to regional development priorities. Based on regulations, portions of Special Autonomy Funds are directed toward economic and social infrastructure development. This contributes to the strong influence of transfers on infrastructure capital expenditure in Aceh.

The finding that control variables PAD and Other Legitimate Revenue also exert positive and significant effects on infrastructure capital expenditure indicates that efforts to enhance local fiscal capacity remain important. However, the transfer coefficient magnitude exceeds that of PAD, demonstrating that transfers remain the dominant factor in determining infrastructure expenditure allocation.

***Absence of Fixed Asset Value Mediation Role***

The finding that fixed asset value does not mediate the relationship between transfers and infrastructure capital expenditure constitutes an intriguing result with important implications. Indeed, the negative (albeit insignificant) coefficient indicates a tendency opposing theoretical expectations. Several explanations may underlie this finding.

First, information regarding fixed asset value may not yet be effectively integrated into regional government planning and budgeting processes. Although accrual-based accounting has been implemented and fixed asset values are reported in balance sheets, utilization of such information for investment decision-making remains limited. This aligns with Salah and Alsharairi's (2025) findings identifying that despite accrual accounting reforms and asset management potentially providing synergy, in practice these two systems often operate separately. Too and Amadi-Echendu (2010) also emphasize that although strategic frameworks for infrastructure asset management have been developed, their implementation in the public sector continues to face various obstacles.

Second, fixed asset data quality may remain an issue affecting information reliability for decision-making. Several regions still confront challenges in asset inventorization, valuation, and recording accurately and comprehensively. Data inaccuracy can cause such information to lack credibility or receive insufficient consideration in investment planning processes. Costa et al. (2025) identify that effective capital investment planning in infrastructure assets requires high-quality asset condition data, often unavailable in developing country regional governments.

Third, infrastructure development priorities in regional governments may be driven more by political factors and responsiveness to public demands rather than technical considerations regarding existing infrastructure stock. In local democracy systems, elected regional leaders tend to demonstrate visible achievements with short-term impacts, often meaning new infrastructure development rather than existing infrastructure maintenance (Lewis et al., 2020; Yilmaz & Zahir, 2020). This causes infrastructure expenditure allocation decisions to insufficiently consider accumulated asset values.

Fourth, in Aceh's context with still-significant infrastructure gaps, regional governments may consider existing infrastructure stock inadequate regardless of recorded asset values. This causes continued drives for new infrastructure investment without excessive consideration of accumulated fixed asset values. Foster et al.'s (2022) findings demonstrating that infrastructure spending in developing countries remains below optimal needs support this explanation. Chaponda (2025) adds that in contexts with large infrastructure gaps, investment priorities are often determined by infrastructure needs gap analysis rather than recorded asset values.

The negative coefficient sign, though insignificant, on fixed asset value's effect on infrastructure capital expenditure indicates a tendency for regional governments with higher asset values to allocate less to new capital spending. This may reflect substitution between new investment and existing infrastructure maintenance, consistent with optimal allocation theory between investment and maintenance articulated by Agénor (2005). Nevertheless, coefficient insignificance indicates that this pattern lacks consistency across all districts/municipalities or time periods, with other factors dominating infrastructure capital expenditure allocation determination.

***Implications for Theory and Policy***

This research's findings possess several important implications from both theoretical and practical perspectives. From theoretical perspectives, this study demonstrates that simple models assuming direct relationships between fiscal transfers and infrastructure expenditure remain relevant in developing country subnational government contexts. Despite accrual-based accounting reforms being implemented and asset information being available, utilization of such information in investment decision-making processes remains limited. This confirms Salah and Alsharairi's (2025) findings that information availability does not automatically translate into enhanced asset management quality and decision-making.

These findings also provide insights regarding the importance of distinguishing between information availability and information utilization in decision-making. Accounting reforms generating more comprehensive financial statements do not automatically enhance decision-making quality if not accompanied by analytical capacity strengthening, information system integration, and organizational culture changes promoting evidence-based decision-making.

From policy perspectives, these findings underscore the necessity of interventions to enhance asset information utilization in infrastructure investment planning. Several key interventions merit consideration for strengthening the linkage between asset management and infrastructure investment decision-making in Indonesian subnational governments.

Regional governments need to develop integrated asset management systems that connect seamlessly with planning and budgeting systems. These systems must be capable of providing relevant and timely information regarding condition, capacity, and maintenance needs of existing infrastructure, which can become input in new investment planning processes. Implementation of strategic frameworks such as those developed by Too and Amadi-Echendu (2010) and Costa et al. (2025) can serve as references for building these integrated systems. Such integration requires not only technological infrastructure but also institutional arrangements that facilitate information flow across different departments responsible for asset management, planning, and budgeting.

Complementing system development, regional governments must enhance human resource capacity in analyzing asset data and integrating it into investment planning. This encompasses training in cost-benefit analysis, asset lifecycle costing, and infrastructure investment prioritization based on asset condition and development needs. Building analytical capacity proves particularly crucial given that many regional governments in developing countries lack personnel with adequate skills in infrastructure economics and asset management. Technical assistance programs and knowledge transfer mechanisms can accelerate capacity building in this domain.

Beyond capacity building, budgeting processes need to be redesigned such that information regarding fixed asset value and condition becomes mandatory consideration in infrastructure capital expenditure proposal submission and evaluation. This can be implemented through technical assessment mechanisms integrating asset information into prioritization criteria, consistent with Chaponda's (2025) recommendations regarding integrating infrastructure planning and budgeting. Such procedural changes ensure that investment decisions systematically consider existing asset stock rather than being driven solely by political pressures or ad hoc demands.

Strengthening accountability and transparency in asset reporting and infrastructure investment constitutes another critical intervention. Enhanced reporting on fixed assets and infrastructure investment, coupled with greater public transparency, can encourage regional governments to pay greater attention to asset management quality and infrastructure investment decisions. Schwartz et al. (2020) emphasize transparency importance in well spent infrastructure governance, noting that public disclosure of asset condition and investment rationales can improve resource allocation efficiency and reduce opportunities for rent-seeking.

Regional governments should also develop more comprehensive infrastructure performance indicators beyond mere asset values recorded in balance sheets. These indicators should encompass level of service, physical condition, utilization rates, and needs gaps. Such multidimensional indicators can provide more relevant information for investment decision-making compared to solely relying on financial values in balance sheets, which may not adequately capture infrastructure functionality and service quality. Performance-based indicators can also facilitate better monitoring of infrastructure outcomes and more effective prioritization of investments.

Finally, consistent with second-generation theory of fiscal federalism (Yilmaz & Zahir, 2020), consideration should be given to altering incentive structures for regional leaders and financial management officials. Current political economy dynamics often incentivize visible short-term physical development rather than long-term infrastructure efficiency and effectiveness. Modifying performance evaluation criteria for regional leaders to incorporate infrastructure sustainability metrics, asset management quality, and long-term service delivery outcomes can realign incentives toward more strategic infrastructure investment. This may involve adjustments to intergovernmental transfer mechanisms to reward regions demonstrating superior asset management practices and efficient infrastructure spending.

## CONCLUSIONS AND RECOMMENDATIONS

This research analyzes the impact of intergovernmental transfers on infrastructure capital expenditure while considering fixed asset value as an intervening variable in 23 districts/municipalities in Aceh Province during 2008-2021. Employing path analysis and panel data, this study identifies direct and indirect pathways in these relationships.

The principal findings reveal that intergovernmental transfers exert positive and highly significant effects on infrastructure capital expenditure through direct pathways ($\beta = 0.412$, $p < 0.001$). Each 1% increase in transfers drives 0.412% augmentation in infrastructure capital expenditure. This confirms that fiscal transfers constitute principal determinants of regional government capacity to finance infrastructure development, consistent with fiscal decentralization literature (Kis-Katos & Sjahrir, 2017; Manga Amougou, 2025; Tang et al., 2024; Lago et al., 2024).

However, this research finds that fixed asset value does not mediate the relationship between transfers and infrastructure capital expenditure. Fixed asset value's effect on infrastructure capital expenditure proves negative and statistically insignificant ($\beta = -0.039$, $p = 0.279$), with the indirect effect also insignificant (-0.023, $p = 0.273$). These findings indicate that information regarding fixed asset accumulation has not yet become strong consideration in infrastructure expenditure allocation decisions. Indeed, the negative coefficient tendency indicates that regional governments with higher asset values may slightly reduce new capital spending allocation, though this effect lacks sufficient strength to achieve statistical significance.

These findings underscore the gap between asset information availability (through accrual-based accounting implementation) and such information's utilization in investment decision-making. This aligns with Salah and Alsharairi's (2025) findings demonstrating that although accounting and asset management can evolve together, in practice this integration has not occurred optimally.

The implications of these findings necessitate strengthening asset management systems and enhancing regional government capacity to integrate asset information into planning and budgeting processes. Accounting reforms alone prove insufficient to enhance infrastructure investment decision-making quality if not accompanied by integrated information system development, analytical capacity enhancement, and organizational culture changes promoting evidence-based decision-making.

The estimated model possesses reasonably high explanatory power, with adjusted $R^2$ value of 0.6364 (63.64%). This indicates that model variables can explain approximately 63.64% of variation in infrastructure capital expenditure, while the remainder (36.36%) is explained by factors outside the model, such as political factors, regional leader characteristics, governance quality, and regional development priorities requiring exploration in future research.

This research possesses several limitations opening opportunities for further research. First, aggregate data utilization at district/municipality level cannot capture variation at more micro levels, such as variation across infrastructure sectors or sub-districts. Future research can employ more disaggregated data to analyze heterogeneity in inter-variable relationships. Second, the limited observation period (14 years) may prove insufficient for observing long-term effects of asset accumulation on infrastructure investment decisions. Research with longer observation periods can provide more comprehensive insights. Third, this research has not explored institutional and political factor roles potentially influencing inter-variable relationships. Future research can integrate variables such as governance quality, political cycles, regional leader characteristics, and administrative capacity into analytical models, consistent with second-generation theory of fiscal federalism perspectives (Yilmaz & Zahir, 2020).

## ADVANCED RESEARCH

Future research can also explore effect heterogeneity of fiscal transfers on infrastructure expenditure based on transfer types (DAU, DAK, DBH, Special Autonomy Funds) and infrastructure sectors (roads, irrigation, clean water, etc.) to provide more specific insights for transfer allocation policy.

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