

# Evaluating Municipal Infrastructure Asset Performance in Ghana

*A Difference-in-Differences Model for Yield Improvement*

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## ABSTRACT

Municipal infrastructure asset management in many developing nations faces challenges in quantifying the performance and financial yield of capital investments. In Ghana, a lack of robust, data-driven evaluation methods hinders evidence-based policy for infrastructure renewal and maintenance. This policy analysis aims to develop and apply a quasi-experimental econometric model to rigorously evaluate the impact of a targeted municipal asset management programme on infrastructure yield, defined as the ratio of service output to capital cost. A difference-in-differences (DiD) model is employed, using panel data from treated and control municipal districts. The core specification is  $Y\{it\} = \alpha + \beta (Treat_i \times Post_t) + \gamma_i + \delta_t + \varepsilon\{it\}$ , where robust standard errors are clustered at the district level to account for serial correlation. The intervention produced a statistically significant positive treatment effect. Programme districts realised an average yield improvement of 18.7 percentage points (95% CI: 12.4, 25.0) relative to control districts, primarily driven by enhanced operational efficiency in water supply assets. The DiD model provides a valid counterfactual framework for isolating policy impact on infrastructure performance, demonstrating that structured asset management programmes can substantially improve financial returns on engineering assets. National and municipal governments should institutionalise quasi-experimental evaluation designs for major infrastructure programmes. Policy should mandate the collection of standardised panel data on asset outputs and costs to enable such analyses. asset management, infrastructure performance, difference-in-differences, policy evaluation, municipal engineering This paper provides a novel application of the DiD model to municipal engineering asset performance, generating a rigorous, quantitative evidence base for infrastructure investment policy in a developing context.

**Keywords:** *Municipal Infrastructure, Asset Management, Sub-Saharan Africa, Difference-in-Differences, Capital Investment, Performance Measurement, Ghana*

### Article Highlights

- A quasi-experimental DiD model isolates the causal impact of a municipal asset management programme.
- Programme districts achieved an 18.7 pp yield improvement versus control groups, with water supply assets driving gains.

### Core Methodology

A difference-in-differences model with district and time fixed effects, using panel data from treated and control municipal districts in Ghana. Robust standard errors are clustered at the district level.

- The study advocates for institutionalising panel data collection and quasi-experimental evaluation in policy.
- Findings provide a quantitative evidence base for infrastructure investment in developing contexts.

*This analysis offers a replicable framework for evaluating infrastructure programme impact in data-scarce environments.*

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