

A Difference-in-Differences Framework for Evaluating Municipal Infrastructure Asset Performance in Ethiopia

Meklit Gebremedhin¹, Abel Tadesse^{2,3}

Department of Electrical Engineering, Adama Science and Technology University (ASTU) | Africa Centers for Disease Control and Prevention (Africa CDC), Addis Ababa | Adama Science and Technology University (ASTU)

Correspondence: mgebremedhin@outlook.com

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ABSTRACT

Background: Municipal infrastructure asset management in developing nations often lacks robust, quantitative frameworks for evaluating the performance of capital investments. In Ethiopia, the assessment of systems such as roads, water supply, and public buildings has historically relied on cross-sectional data or simple before-and-after comparisons, which fail to account for secular trends and confounding factors.

Purpose and objectives: This article presents a methodological framework for rigorously evaluating the causal impact of municipal asset management interventions. The primary objective is to adapt the difference-in-differences econometric model for engineering performance analysis, specifically to measure yield improvements in asset serviceability and condition.

Keywords: *difference-in-differences, municipal infrastructure, asset performance, Sub-Saharan Africa, quantitative evaluation, engineering asset management, developing economies*

Article Highlights

- Adapts the difference-in-differences econometric model for engineering performance analysis.
- Uses panel data from treated and control asset groups in a quasi-experimental design.
- Provides a method to measure yield improvements in asset serviceability and condition.
- Particularly suited to contexts where randomized controlled trials are not feasible.

Core Model Specification

$Y_{it} = \beta_0 + \beta_1 \text{Treat}_i + \beta_2 \text{Post}_t + \delta (\text{Treat}_i \times \text{Post}_t) + \epsilon_{it}$, where δ captures the average treatment effect on the performance metric.

This is a methodology article presenting an analytical framework, not empirical results from a specific application.

ABSTRACT-ONLY PUBLICATION

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