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A Difference-in-Differences Model for the Cost-Effectiveness Evaluation of Transport Maintenance Depot Systems in South Africa

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ABSTRACT

Background: The cost-effectiveness of transport maintenance depot systems is a critical concern for infrastructure asset management, yet robust quantitative evaluation methods are lacking. Existing approaches often fail to account for unobserved confounding factors when comparing different depot management regimes.

Purpose and objectives: This study aimed to develop and apply a quasi-experimental econometric model to rigorously evaluate the cost-effectiveness of different transport maintenance depot systems. The objective was to isolate the causal effect of specific system interventions on maintenance expenditure.

Keywords: *cost-effectiveness analysis, difference-in-differences, transport maintenance, infrastructure asset management, Sub-Saharan Africa*

Article Highlights

- Difference-in-differences model isolates causal effects from observational data.
- Intervention system reduced maintenance costs by approximately 14%.
- Methodology controls for time-invariant unobserved heterogeneity.
- Provides a robust framework for evaluating infrastructure programmes.

Methodological Insight

The applied DiD estimator ($\delta = -0.15$, CI: $[-0.23, -0.07]$) successfully disentangles the intervention's effect from underlying temporal trends and fixed depot characteristics.

This study offers a transferable econometric framework for infrastructure asset management.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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