

A Quasi-Experimental Design for the Cost-Effectiveness Evaluation of Railway Maintenance Depot Systems in Uganda

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ABSTRACT

Background: The cost-effectiveness of railway maintenance depot systems in developing economies is poorly understood, with a lack of robust methodological frameworks for evaluation under real-world constraints.

Purpose and objectives: This study aimed to develop and apply a novel quasi-experimental design to rigorously evaluate the cost-effectiveness of different maintenance depot systems, focusing on operational efficiency and lifecycle costs.

Keywords: *Railway maintenance, Cost-effectiveness, Quasi-experimental design, Sub-Saharan Africa, Infrastructure management, Developing economies, Depot systems*

Article Highlights

- A novel quasi-experimental design for causal inference in infrastructure management.
- Centralised depot systems reduced maintenance costs by 17.5% versus decentralised models.
- Methodological framework applicable to resource-constrained operational environments.
- Stable asset availability maintained alongside significant cost efficiencies.

Methodological Note

The study employed a difference-in-differences model with robust standard errors clustered at the depot level to isolate the treatment effect.

This study offers a practical framework for evaluating infrastructure investments in developing economies.

ABSTRACT-ONLY PUBLICATION

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