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A Methodological Framework for the Cost-Effectiveness Analysis of Nigerian Transport Maintenance Depots

A Panel-Data Estimation Approach

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ABSTRACT

Background: The systematic evaluation of transport maintenance depot performance in developing economies is hindered by a lack of robust, data-driven methodologies. Current assessments often rely on cross-sectional data, which fails to account for unobserved heterogeneity and temporal dynamics, leading to potentially biased estimates of cost-effectiveness.

Purpose and objectives: This article presents a novel methodological framework designed to measure the cost-effectiveness of transport maintenance depots. Its primary objective is to provide a replicable analytical procedure using panel-data econometrics to isolate true efficiency gains from observed cost and output data.

Keywords: *Cost-effectiveness analysis, Panel-data estimation, Transport maintenance depots, Developing economies, Sub-Saharan Africa, Infrastructure management, Econometric modelling*

Article Highlights

- Framework controls for unobserved heterogeneity through fixed-effects panel modelling
- Addresses limitations of cross-sectional analysis in infrastructure evaluation
- Provides replicable analytical procedure for developing economy contexts
- Demonstrates statistical rigor with cluster-robust standard errors

Core Estimation Equation

$C_{it} = \alpha_i + \beta'X_{it} + \delta_t + \epsilon_{it}$, where α_i represents depot-specific fixed effects controlling for time-invariant unobserved characteristics.

This methodology article presents an analytical framework rather than empirical findings.