

# Methodological Evaluation and Cost-Effectiveness of Industrial Machinery Fleet Systems in Nigeria

*A Difference-in-Differences Analysis*

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## ABSTRACT

**Background:** The management of industrial machinery fleets is critical for infrastructure development, yet robust empirical evidence on the cost-effectiveness of systematic fleet management in developing economies is scarce. Existing evaluations often lack rigorous counterfactual analysis.

**Purpose and objectives:** This study aims to methodologically evaluate the impact of implementing structured fleet management systems on operational costs and to assess their cost-effectiveness within the Nigerian construction and industrial sectors.

**Keywords:** Industrial machinery, fleet management, cost-effectiveness, difference-in-differences, Sub-Saharan Africa, Nigeria, infrastructure development

### Article Highlights

- Difference-in-differences design isolates causal impact on operational costs.
- Structured fleet systems reduce average monthly maintenance costs by 18.7%.
- Estimated benefit-cost ratio of 3.2 demonstrates strong economic return.
- Provides robust methodological framework for evaluation in developing economies.

### Core Methodology

Quasi-experimental difference-in-differences (DiD) analysis with panel data, using cluster-robust standard errors at the firm level to estimate causal effects.

*This study introduces a robust causal inference framework to fleet management evaluation in Sub-Saharan Africa.*

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