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Methodological Evaluation and Efficiency Gains in Nigerian Industrial Machinery Fleets

A Difference-in-Differences Analysis

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ABSTRACT

Background: The operational efficiency of industrial machinery fleets is a critical determinant of productivity and economic output in developing economies. In Nigeria, a lack of robust, quantitative methodologies for evaluating the impact of systematic interventions on fleet performance has hindered evidence-based asset management.

Purpose and objectives: This study aims to develop and apply a rigorous econometric framework to quantify the causal effect of a structured maintenance and telematics implementation programme on the operational efficiency of selected industrial machinery fleets.

Keywords: *Industrial machinery, operational efficiency, Sub-Saharan Africa, difference-in-differences, maintenance optimisation, productivity analysis, developing economies*

Article Highlights

- A quasi-experimental DiD model isolates causal impact from observational data.
- Structured maintenance and telematics boosted fleet OEE by 17.5%.
- The study provides a rigorous econometric framework for asset management.
- Findings support evidence-based policy for industrial productivity in SSA.

Methodological Note

The core DiD model: $Y_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \delta(Treat_i \times Post_t) + \varepsilon_{it}$, with inference based on cluster-robust standard errors.

This analysis offers a template for causal evaluation of engineering interventions.

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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