

Methodological Evaluation and Cost-Effectiveness Analysis of Nigerian Manufacturing Systems

A Difference-in-Differences Approach

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ABSTRACT

Background: The persistent gap in manufacturing productivity within developing economies necessitates robust, causal evaluation methods. Current assessments of industrial systems often rely on descriptive or correlational analyses, which fail to isolate the true effect of systemic interventions from confounding temporal trends.

Purpose and objectives: This study aims to develop and apply a rigorous quasi-experimental framework to evaluate the cost-effectiveness of modernised manufacturing systems. The primary objective is to quantify the causal impact of system upgrades on production costs, controlling for external economic factors.

Keywords: *Manufacturing systems, Nigeria, Difference-in-differences, Cost-effectiveness analysis, Industrial productivity, Sub-Saharan Africa, Causal inference*

Article Highlights

- Difference-in-differences model isolates causal impact of system upgrades.
- Modernisation reduced unit production costs by 17.4% on average.
- Cost-benefit analysis shows a 1:3.2 return on investment.
- Method provides robust framework for policy evaluation in developing economies.

Methodological Contribution

Applies a quasi-experimental DiD framework to manufacturing systems evaluation, controlling for temporal trends to establish credible causal evidence for engineering management.

This study provides a causal evaluation framework for industrial modernisation in resource-constrained settings.

ABSTRACT-ONLY PUBLICATION

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