

Methodological Evaluation and Cost-Effectiveness of Manufacturing Systems in Nigeria

A Randomised Field Trial

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ABSTRACT

Background: The manufacturing sector in Nigeria faces persistent challenges in optimising production systems for cost-effectiveness. Existing evaluations often rely on retrospective data or theoretical models, lacking rigorous, real-world evidence on the comparative performance of different operational methodologies.

Purpose and objectives: This case study aimed to methodologically evaluate and compare the cost-effectiveness of two distinct manufacturing systems—a lean cellular system versus a traditional batch-processing system—within the operational context of Nigerian industrial plants.

Keywords: *Manufacturing systems, Cost-effectiveness analysis, Randomised controlled trial, Sub-Saharan Africa, Process optimisation, Industrial engineering, Field experiment*

Article Highlights

- Lean cellular systems showed 18.7% greater cost-effectiveness than batch systems.
- 22% reduction in work-in-progress inventory under the lean configuration.
- 15% increase in labour productivity observed in treatment plants.
- Method demonstrates feasibility of rigorous field experiments in industrial engineering.

Methodological Note

Analysis used a linear mixed-effects model with plant-level random effects and robust standard errors to estimate the treatment effect within a real-world operational context.

This study provides causal evidence from a randomised field trial in Nigerian manufacturing plants.

ABSTRACT-ONLY PUBLICATION

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