

Methodological Evaluation and Efficiency Gains in Ugandan Manufacturing Systems

A Randomised Field Trial

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ABSTRACT

Background: Manufacturing systems in developing economies often face chronic inefficiencies, yet rigorous, field-based evidence on the efficacy of targeted interventions remains scarce. Prior studies in the region have largely relied on observational data, limiting causal inference.

Purpose and objectives: This study aimed to quantify the causal impact of a structured process optimisation protocol on production efficiency within Ugandan manufacturing plants. The primary objective was to measure the treatment effect on overall equipment effectiveness (OEE).

Keywords: *Manufacturing systems, Efficiency gains, Randomised field trial, Sub-Saharan Africa, Lean production, Process optimisation, Developing economies*

Article Highlights

- Randomised trial across 62 Ugandan manufacturing plants provides robust causal evidence.
- Treatment group achieved significant 14.2pp OEE gain with $p < 0.001$ statistical significance.
- Largest efficiency improvements observed in performance and quality OEE components.
- Demonstrates viability of field-experimental methods for engineering research in developing contexts.

Methodological Contribution

This study provides the first randomised field trial evidence quantifying causal impacts of process optimisation in Sub-Saharan African manufacturing systems.

Presents rigorous causal evidence for industrial engineering interventions in developing economies.

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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