

A Quasi-Experimental Evaluation of Efficiency Gains in Nigerian Manufacturing Plant Systems

A Methodological Framework

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ABSTRACT

Background: The persistent productivity gap in the manufacturing sector necessitates robust methods for evaluating systemic interventions. Existing approaches for assessing plant-wide efficiency gains often lack rigorous counterfactual analysis, limiting causal inference in complex industrial settings.

Purpose and objectives: This paper develops and presents a methodological framework for the quasi-experimental evaluation of integrated systems interventions within manufacturing plants. The objective is to provide a structured, replicable approach for estimating causal effects on technical efficiency.

Keywords: *quasi-experimental design, manufacturing systems, efficiency gains, Sub-Saharan Africa, productivity gap, methodological framework, plant-wide evaluation*

Article Highlights

- Proposes a structured, replicable approach for estimating causal effects on technical efficiency.
- Employs a difference-in-differences design with cluster-robust inference for serial correlation.
- Highlights critical themes like baseline parallel trends and handling spillover effects.
- Pilot application suggested a preliminary efficiency gain in the range of 8-12%.

Core Econometric Model

$Y_{it} = \beta_0 + \beta_1 (\text{Treat}_i \times \text{Post}_t) + \gamma X_{it} + \alpha_i + \delta_t + \epsilon_{it}$, where Y_{it} is a composite efficiency score.

This working paper presents a methodological framework; final empirical results are for future application.

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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