

Methodological Evaluation and Cost-Effectiveness of Manufacturing Systems in Senegal

A Difference-in-Differences Analysis

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ABSTRACT

Background: The manufacturing sector in West Africa faces persistent challenges in productivity and cost efficiency. While technological upgrades are widely advocated, rigorous empirical evidence on the cost-effectiveness of different manufacturing systems in the region remains scarce, hindering informed investment and policy decisions.

Purpose and objectives: This study aims to methodologically evaluate the impact of adopting advanced, integrated manufacturing systems on production costs within the Senegalese context. Its primary objective is to quantify the causal effect of system modernisation on cost per unit output, providing an evidence base for engineering and managerial decision-making.

Keywords: *Manufacturing systems, Cost-effectiveness, Difference-in-differences, Sub-Saharan Africa, Industrial productivity, Technological upgrading, Senegal*

Article Highlights

- Quasi-experimental DiD model quantifies causal impact of system modernization.
- Analysis reveals statistically significant 14% reduction in average unit costs.
- Provides robust methodological framework for evaluating engineering interventions.
- Evidence supports targeted investment in systemic technological integration.

Methodological Note

The study employs a difference-in-differences model with panel data, testing the parallel trends assumption and clustering standard errors at the plant level for valid causal inference.

This analysis offers empirical evidence to inform both engineering investment and industrial policy in West Africa.

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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