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Methodological Evaluation and Efficiency Gains of Process-Control Systems in Senegal

A Difference-in-Differences Analysis

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ABSTRACT

Background: The adoption of automated process-control systems in industrial and construction sectors is promoted to enhance operational efficiency. However, rigorous quantitative evidence of their impact, particularly in West African contexts with distinct infrastructural and operational constraints, remains scarce.

Purpose and objectives: This study aims to methodologically evaluate the causal effect of implementing modern process-control systems on production efficiency within the Senegalese structural engineering sector, quantifying the magnitude of any gains.

Keywords: *process-control systems, operational efficiency, difference-in-differences, industrial automation, Sub-Saharan Africa, methodological evaluation, efficiency gains*

Article Highlights

- Quasi-experimental design with 42 firms provides robust causal evidence.
- Process-control adoption yielded an 18.4% efficiency gain relative to controls.
- Findings are specific to the infrastructural context of Senegal.
- Results robust to multiple sensitivity checks and cluster-robust inference.

Core Methodology

Difference-in-differences analysis comparing 21 treatment firms with 21 matched controls over a multi-year period. The key estimator ($\delta = 0.184$) quantifies the causal effect of system adoption.

This study offers novel quantitative evidence for industrial automation in a West African context.

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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