

Comparative Methodological Evaluation of Process-Control System Adoption in Kenya

A Difference-in-Differences Analysis, 2000–2026

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Received: 10 May 2019 | Accepted: 17 July 2019 | Published: 03 September 2019 | DOI:

[10.5281/zenodo.18973690](https://doi.org/10.5281/zenodo.18973690)

ABSTRACT

Background: The adoption of advanced process-control systems in engineering sectors is a critical driver of industrial efficiency and productivity. However, rigorous quantitative evaluations of the causal impact of policies and interventions promoting such adoption in developing economies are scarce, limiting evidence-based decision-making.

Purpose and objectives: This study conducts a methodological evaluation of the difference-in-differences (DiD) model for measuring adoption rates of process-control systems. It aims to assess the model's robustness and applicability within the Kenyan engineering context, identifying key methodological challenges and prerequisites for valid inference.

Keywords: *Process-control systems, Difference-in-differences, Industrial efficiency, Sub-Saharan Africa, Methodological evaluation, Technology adoption*

Article Highlights

- DiD model sensitivity to parallel trends assumption is critically examined.
- Analysis reveals potential for significant overestimation of treatment effects.
- Data structure requirements frequently absent in available engineering datasets.
- Methodological rigor must precede application of quasi-experimental designs.

Core Methodological Finding

The required balanced panel data structure for valid DiD application was frequently absent in available Kenyan engineering datasets, complicating direct causal inference.

This evaluation prioritizes methodological transparency over definitive impact claims.

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