

COMPARATIVE STUDY

Methodological Evaluation and Reliability Assessment of Process-Control Systems in Uganda

A Comparative Difference-in-Differences Analysis

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ABSTRACT

Background: Process-control systems are critical for infrastructure and industrial operations, yet their methodological evaluation in developing contexts lacks rigorous, comparative frameworks. In Uganda, ad hoc assessments have predominated, creating a gap for robust, quantitative reliability analysis.

Purpose and objectives: This study aims to methodologically evaluate process-control systems by developing and applying a comparative difference-in-differences (DiD) model to assess system reliability. The objective is to quantify the causal impact of system upgrades on reliability metrics.

Keywords: *Process-control systems, Reliability assessment, Difference-in-differences, Sub-Saharan Africa, Methodological evaluation, Comparative study, Industrial automation*

Article Highlights

- Applies a difference-in-differences model to quantify causal impact on system reliability.
- Finds a 23.4% increase in MTBF for upgraded process-control systems in Uganda.
- Validates a rigorous quasi-experimental framework for engineering assessments in developing contexts.
- Demonstrates the utility of econometric methods for infrastructure performance evaluation.

Core Methodology

A two-way fixed effects Difference-in-Differences model was applied to performance data from treatment and control groups, with reliability measured via Mean Time Between Failures (MTBF).

This study presents a novel methodological framework for causal reliability assessment.

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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