

Methodological Evaluation and Reliability Assessment of Kenyan Manufacturing Plant Systems

A Difference-in-Differences Approach

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ABSTRACT

Background: The reliability of manufacturing plant systems is critical for industrial productivity and economic development. In Kenya, a lack of robust, quantitative methodologies for evaluating system performance and the impact of interventions has hindered evidence-based maintenance and investment decisions.

Purpose and objectives: This study aims to develop and apply a rigorous econometric framework to evaluate the reliability of manufacturing systems. The primary objective is to quantify the causal effect of a systematic maintenance programme on plant operational uptime.

Keywords: *manufacturing systems, reliability assessment, difference-in-differences, industrial productivity, sub-Saharan Africa, methodological evaluation, plant maintenance*

Article Highlights

- A difference-in-differences model quantifies the causal impact of maintenance on system reliability.
- The intervention yielded a persistent 7.3 percentage point increase in operational uptime.
- The study demonstrates the value of quasi-experimental designs for engineering evaluations.
- Findings support evidence-based investment in systematic plant maintenance programmes.

Core Methodology

A quasi-experimental difference-in-differences model with panel data, clustering robust standard errors at the plant level to isolate the causal effect of the maintenance intervention.

This study presents a novel econometric framework for evaluating engineering system reliability.



ABSTRACT-ONLY PUBLICATION

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