

Methodological Evaluation and Risk Reduction in Ghanaian Manufacturing Systems

A Difference-in-Differences Case Study

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ABSTRACT

Background: Manufacturing systems in developing economies face unique operational risks, including equipment failure and supply chain disruption, which impede productivity and safety. Systematic evaluation of engineering interventions to mitigate these risks remains methodologically underdeveloped in the regional literature.

Purpose and objectives: This case study aims to methodologically evaluate the efficacy of a structured engineering risk management programme implemented across multiple plants. Its objective is to quantify the programme's causal impact on operational downtime using a robust quasi-experimental design.

Keywords: *Manufacturing systems, Operational risk, Difference-in-differences, Sub-Saharan Africa, Process safety, Ghanaian industry, Reliability engineering*

Article Highlights

- Difference-in-differences model isolates causal impact of risk management intervention.
- Intervention reduced operational downtime by 5.2 percentage points with high statistical significance.
- Study provides methodological framework for evaluating engineering programmes in developing economies.
- Findings support adoption of formal, data-driven risk assessment protocols in manufacturing.

Methodological Contribution

This study provides a novel application of the difference-in-differences econometric model to isolate the causal effect of an engineering risk management intervention within an African industrial context.

This case study offers a robust quasi-experimental design for evaluating engineering interventions.



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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