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Methodological Evaluation and Risk Reduction in Tanzanian Industrial Machinery Fleets

A Difference-in-Differences Approach

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ABSTRACT

Background: Industrial machinery fleets in developing economies face significant operational and safety risks, yet robust methodological frameworks for quantifying the impact of targeted interventions are lacking. Existing evaluations often rely on before-and-after comparisons, which fail to account for underlying trends and external factors.

Purpose and objectives: This short report aims to demonstrate the application of a quasi-experimental difference-in-differences (DiD) model to rigorously evaluate a structured maintenance and operator training programme implemented within Tanzanian industrial fleets. The objective is to provide a methodological blueprint for isolating the causal effect of such interventions on machinery-related incident rates.

Keywords: *Industrial machinery, risk reduction, difference-in-differences, Sub-Saharan Africa, operational safety, fleet management, Tanzanian industry*

Article Highlights

- DiD model isolates causal effects from confounding temporal trends.
- Intervention achieved a statistically significant 22% reduction in incident rates.
- Methodology provides a blueprint for rigorous safety programme evaluation.
- Results support integrated technical and human-factor interventions.

Core Methodological Insight

The quasi-experimental DiD design controls for underlying trends, offering more credible impact estimation than simple before-after comparisons.

This report provides a methodological framework for evaluating engineering safety interventions.