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A Quasi-Experimental Evaluation of Risk Reduction Methodologies for Industrial Machinery Fleets in Senegal

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ABSTRACT

Background: Industrial machinery fleets in developing economies present significant operational safety challenges. Existing risk management frameworks are often adapted from high-income contexts and lack rigorous, context-specific evaluation regarding their effectiveness in reducing incident rates.

Purpose and objectives: This working paper aims to methodologically evaluate the efficacy of a structured, technology-assisted risk reduction protocol for heavy machinery fleets. The primary objective is to quantify the causal impact of the intervention on safety incident frequency using a quasi-experimental design.

Keywords: *quasi-experimental design, industrial machinery safety, risk reduction methodologies, Sub-Saharan Africa, fleet management, developing economies, operational safety*

Article Highlights

- Difference-in-differences analysis reveals a 32% reduction in safety incidents.
- Technology-assisted protocols show measurable impact in Sub-Saharan context.
- Causal inference methods applied to engineering safety evaluation.
- Tailored frameworks outperform generic risk management checklists.

Methodological Note

The study employs a quasi-experimental difference-in-differences design with robust standard errors clustered at fleet level, providing causal evidence for intervention efficacy.

This working paper presents preliminary findings from a field evaluation in Senegal.