Methodological Evaluation and Risk Reduction Data for Industrial Machinery Fleets

A Randomised Field Trial in Ghana

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ABSTRACT

Background: Industrial machinery fleets in developing economies face significant operational risks, yet structured, data-driven methodologies for quantifying and mitigating these risks are scarce. Existing frameworks often lack empirical validation in real-world settings, particularly in West African industrial contexts.

Purpose and objectives: This data descriptor presents a novel methodological framework for evaluating machinery fleet systems and provides a corresponding dataset from a randomised field trial. The primary objective was to empirically measure the efficacy of a structured risk-reduction protocol on machinery availability and incident frequency.

Keywords: *Industrial machinery, risk reduction, randomised controlled trial, Sub-Saharan Africa, field data, predictive maintenance, operational safety*

Article Highlights

• Randomised controlled trial design successfully implemented in a West African industrial setting.
• Intervention yielded a 34.7% lower incidence rate of major mechanical failures.
• Provides a novel methodological framework and dataset for machinery risk evaluation.
• Demonstrates the viability of rigorous field trials for engineering interventions.

Trial Design & Analysis

A randomised controlled trial with heavy industrial equipment, using a generalised linear mixed model to analyse the effect of a predictive maintenance and operator training protocol on incident frequency.

This data descriptor presents a validated methodological framework and corresponding field dataset.

📄 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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