

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

Fatou Sarr^{1,2}, Abdoulaye Diop^{2,3}, Aïssatou Diallo²
Mamadou Ndiaye^{1,4}

Department of Civil Engineering, Université Alioune Diop de Bambey (UADB) | Université Gaston Berger (UGB),
Saint-Louis | African Institute for Mathematical Sciences (AIMS) Senegal | Department of Civil Engineering, African
Institute for Mathematical Sciences (AIMS) Senegal

Correspondence: fsarr@hotmail.com

Received: 01 April 2021 | Accepted: 08 May 2021 | Published: 24 June 2021 | DOI: [10.5281/zenodo.18972631](https://doi.org/10.5281/zenodo.18972631)

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.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

REQUEST FULL PAPER

 **Email:** info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We
welcome your submissions!**

Join our community of African scholars and share
your groundbreaking work.

 **Submit at:** app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global
Knowledge