

A Quasi-Experimental Design for Reliability Assessment in Uganda's Industrial Machinery Fleets

Okello Kato¹

Busitema University

Correspondence: okato@yahoo.com

Received: 03 January 2022 | Accepted: 02 March 2022 | Published: 28 April 2022 | DOI:

[10.5281/zenodo.18972282](https://doi.org/10.5281/zenodo.18972282)

ABSTRACT

Background: Industrial machinery fleets in developing economies face unique operational challenges, including harsh environmental conditions and inconsistent maintenance regimes, which complicate traditional reliability assessments. Existing methodologies often rely on controlled laboratory data or manufacturer specifications, which do not accurately reflect in-service performance in such contexts.

Purpose and objectives: This article presents a novel quasi-experimental design to empirically evaluate the operational reliability of heavy industrial machinery fleets under real-world conditions. The primary objective is to provide a field-validated methodological framework that quantifies reliability metrics while accounting for contextual operational stressors.

Keywords: *Quasi-experimental design, Reliability engineering, Industrial machinery fleets, Sub-Saharan Africa, Maintenance optimisation, System performance evaluation, Developing economies*

Article Highlights

- Proposes a novel quasi-experimental design for real-world reliability assessment.
- Employs a Weibull proportional hazards model with operational covariates.
- Simulation validates power to detect significant MTBF improvements.
- Provides a methodological bridge for data-scarce industrial contexts.

Methodological Innovation

A non-equivalent group, pre-test/post-test structure stratifies fleet units, with intervention groups receiving a standardised preventive maintenance protocol against control groups.

This article presents a methodological framework, with findings based on simulation validation.



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