

Randomised Field Trial for Reliability Assessment of Process-Control Systems in Nigeria

A Methodological Evaluation

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ABSTRACT

Background: Process-control systems are critical for industrial operations in developing economies, yet their reliability is often poorly quantified. In Nigeria, a lack of structured field data on system performance hinders evidence-based maintenance and investment decisions within the engineering sector.

Purpose and objectives: This case study evaluates a methodological framework for conducting a randomised field trial to assess the reliability of industrial process-control systems. The primary objective was to test the feasibility and rigour of the trial design in a real-world, resource-constrained setting.

Keywords: *Process-control systems, Reliability engineering, Randomised field trial, Sub-Saharan Africa, Industrial automation, Methodological evaluation, Developing economies*

Article Highlights

- Evaluates a randomised field trial framework for reliability assessment in resource-constrained settings.
- Finds a significant reliability improvement (HR: 0.65) for systems under the new diagnostic protocol.
- Identifies logistical challenges and data collection on environmental stressors as critical factors.
- Recommends phased implementation and ruggedised data loggers for future applications.

Core Methodological Insight

The randomised trial provides a viable approach for generating high-quality reliability data in challenging operational environments, though it requires careful adaptation to local constraints.

This brief outlines the editorial presentation for a methodological case study.

ABSTRACT-ONLY PUBLICATION

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