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# A Randomised Field Trial for Reliability Diagnostics in Nigerian Manufacturing Systems

*A Methodological Evaluation*

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## ABSTRACT

**Background:** Manufacturing systems in Nigeria face persistent reliability challenges, yet rigorous field-based diagnostic methodologies for these contexts are underdeveloped. Existing reliability models often rely on theoretical assumptions not validated in real-world industrial settings within the region.

**Purpose and objectives:** This study aimed to methodologically evaluate a randomised field trial (RFT) framework for conducting reliability diagnostics in active manufacturing plants. The objective was to assess the framework's feasibility, precision, and practical utility for identifying systemic failure modes.

**Keywords:** *Manufacturing systems reliability, Sub-Saharan Africa, Randomised field trial, Diagnostic methodology, Industrial engineering, Nigerian manufacturing, Reliability engineering*

### Article Highlights

- RFT framework proved feasible for in-situ reliability diagnostics in active plants.
- Intervention group identified 40% more latent failure modes than control lines.
- Primary failure cause shifted from perceived operator error to mechanical wear.
- Structured field approach enhances validity for maintenance decision-making.

### Methodological Insight

The study implemented a randomised field trial across twelve production lines in three plants, using a Weibull proportional hazards model with robust standard errors clustered at plant level.

*This study demonstrates a practical field methodology for reliability diagnostics in industrial settings.*

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