



# Methodological Evaluation of Manufacturing Systems Reliability in Nigerian Plants: A Randomized Field Trial

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## Abstract

Manufacturing systems in Nigerian plants often face challenges related to reliability, which can impact productivity and profitability. A randomized field trial was conducted to measure system reliability by randomly selecting three representative Nigerian manufacturing plants. Data were collected on operational performance metrics and analysed using statistical models. The analysis revealed that the mean time between failures (MTBF) for systems in these plants varied from 120 hours to 365 hours, indicating significant variability across different sectors and plant sizes. This study provides a framework for assessing manufacturing system reliability in Nigerian settings, offering insights into potential areas for improvement. Manufacturing managers should prioritise regular maintenance schedules based on the MTBF analysis to enhance system reliability and operational efficiency. manufacturing systems, reliability assessment, system performance, randomized trial The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Manufacturing Reliability, African Context, Methodological Evaluation, Field Trial, System Dynamics, Statistical Analysis, Quality Control*

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