African Food Processing Technology (Food Science/Technology)

# Methodological Evaluation of Industrial Machinery Fleet Systems in Nigeria: A Randomized Field Trial on System Reliability Assessment

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## Abstract

Industrial machinery fleets play a crucial role in Nigerian food processing technology, yet their reliability remains underexplored. A randomized field trial was conducted to assess the reliability of industrial machinery systems. A mixed-method approach combining quantitative data on machine performance metrics (e.g., downtime, maintenance costs) with qualitative insights from operator interviews was employed. The analysis revealed a significant variation in system uptime across different types of machinery, with an average uptime of 85% and a standard deviation of 10%. This study provides valuable data for improving the maintenance schedules and operational strategies of industrial machinery. Based on findings, it is recommended to implement predictive maintenance models and regular system audits to optimise reliability and reduce downtime. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Nigerian, reliability assessment, randomized trials, statistical analysis, predictive models, geographic information systems, asset management*

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