



# Methodological Evaluation of Quasi-Experimental Design in Industrial Machinery Fleets Systems in Tanzania

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## Abstract

Industrial machinery fleets are essential for efficient operations in various sectors across Tanzania. However, determining their reliability and effectiveness remains a challenge. A mixed-method approach was employed, integrating both quantitative (using a linear regression model) and qualitative data collection techniques. The study utilised a quasi-experimental design to assess the impact of maintenance schedules on machinery performance. The analysis revealed that implementing regular preventive maintenance significantly improved system reliability by an average of 15% across all fleet systems, with no significant outliers in results. This research supports the utility of quasi-experimental design for measuring industrial machinery reliability. The findings suggest a clear path towards more reliable and efficient machinery operations in Tanzanian settings. The adoption of regular maintenance schedules should be encouraged to enhance overall system performance and reduce downtime, thereby improving operational efficiency. Quasi-Experimental Design, Industrial Machinery Reliability, Maintenance Schedules, Tanzania The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + v$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Tanzania, Quasi-experimental design, Industrial machinery, Reliability assessment, System evaluation, Sampling methodology, Data analysis techniques

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