



# Methodological Evaluation of Manufacturing Reliability Systems in Kenyan Plants: A Quasi-Experimental Design Approach

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## Abstract

Manufacturing systems in Kenya are increasingly adopting reliability assessment methodologies to enhance operational efficiency and reduce downtime. A mixed-method approach was employed, combining quantitative data analysis using regression models with qualitative interviews to assess SPIs and user satisfaction. The analysis revealed that the implementation of a comprehensive monitoring system led to a 15% reduction in SPI downtime, indicating improved system reliability (95% confidence interval). The quasi-experimental design successfully identified key factors contributing to increased system reliability and user satisfaction. Further studies should explore the scalability of these findings across different manufacturing sectors within Kenya. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Kenya, Manufacturing Reliability, Quasi-Experimental Design, Data Analysis, Quality Control, Lean Management, System Evaluation

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