



Methodological Evaluation of Manufacturing Plant Systems in Uganda Using Quasi-Experimental Design to Assess System Reliability

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Abstract

The reliability of manufacturing plant systems in Uganda is a critical issue affecting productivity and economic growth. Current methods often rely on traditional statistical techniques which may not fully capture system complexities. The study employs a quasi-experimental design with appropriate control and treatment groups to measure system reliability. Key variables include operational efficiency, maintenance costs, and downtime frequency. A preliminary analysis suggests that the proportion of manufacturing plants experiencing frequent downtime is significantly higher than expected under normal operating conditions. The findings indicate a need for more sophisticated methodological approaches to accurately assess system reliability in Ugandan manufacturing environments. Future research should consider integrating machine learning algorithms into quasi-experimental designs to enhance the predictive accuracy of system reliability assessments. Manufacturing Systems, Reliability Assessment, Quasi-Experimental Design, Machine Learning The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, manufacturing systems, reliability engineering, experimental design, econometrics, supply chain management, geographic information systems*

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