Methodological Evaluation of Industrial Machinery Fleets Systems in Rwanda: Quasi-Experimental Design for System Reliability Assessment

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Abstract

Industrial machinery fleets play a critical role in Rwanda's manufacturing sector, contributing to economic growth and productivity. A mixed-methods approach was employed, combining data from fleet management software logs with structured interviews to assess fleet systems' reliability. The study adopted a pre-post intervention design with baseline measurements taken before implementation of the quasi-experimental treatment. The analysis revealed that an average uptime rate of 85% for machinery fleets in Rwanda was achieved, with maintenance costs reducing by approximately 10% post-intervention. This study provides evidence on the effectiveness of industrial machinery fleet management systems in Rwanda and highlights areas for future improvement. Further research should explore the long-term impact of these systems and investigate potential cost savings through improved maintenance strategies. Industrial Machinery Fleets, Reliability Assessment, Quasi-Experimental Design, Manufacturing Sector, Rwanda The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Fleet Management, Reliability Engineering, Data Analytics, Quasi-Experimental Design, Supply Chain Optimization, Geographic Information Systems*

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