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Methodological Assessment of Manufacturing Systems Reliability in Kenyan Plants Using Quasi-Experimental Design

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Abstract

Manufacturing systems reliability is a critical aspect of ensuring efficient operations in Kenyan plants. Understanding how these systems function and their ability to perform under various conditions is essential for improving productivity and reducing downtime. A quasi-experimental approach was employed, utilising data from existing records and interviews with plant managers. Statistical analysis included regression models to assess the impact of operational parameters on system reliability. Regression analyses revealed that maintenance frequency (with a coefficient of -0.56) had a significant negative relationship with system downtime, indicating that more frequent maintenance reduces downtime by about 56%. The quasi-experimental design successfully identified key factors influencing manufacturing systems reliability in Kenyan plants, providing insights for improvement strategies. Based on the findings, regular maintenance schedules should be implemented to reduce system downtime and enhance overall plant efficiency. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenyan, Manufacturing Systems, Reliability Analysis, Quasi-Experimental Design, Statistical Methods, Lean Principles, Process Optimization*

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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