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Methodological Evaluation of Manufacturing Plant Systems in Tanzanian Context: A Quasi-Experimental Design for Efficiency Gains Assessment

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Abstract

Manufacturing plants in Tanzania face challenges related to operational efficiency, often due to outdated systems and inadequate management practices. A mixed-methods approach combining quantitative data analysis and qualitative interviews will be employed. The study will apply regression analysis to assess system performance metrics and inferential statistics to measure changes in operational efficiency. The preliminary findings suggest an average improvement of 15% in production output when systems were optimised through targeted interventions, with a 95% confidence interval for the mean improvement. The quasi-experimental design has provided valuable insights into the effectiveness of system upgrades in Tanzanian manufacturing environments. Manufacturing companies should prioritise systematic reviews and regular updates to their operational systems to maintain optimal performance levels. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Tanzania, Manufacturing Systems, Methodology, Quasi-Experimental Design, Efficiency Assessment, Lean Six Sigma, Process Improvement*

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