African Infrastructure Planning (Technical focus)

Multilevel Regression Analysis for Assessing System Reliability in Ugandan Manufacturing Plants Systems

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Abstract

Manufacturing plants in Uganda face various challenges that impact their reliability and operational efficiency. Multilevel regression analysis was applied to assess the relationship between system reliability and multiple predictors at both plant-level (individual facilities) and sector-level (industry characteristics). The analysis revealed that investment in automation significantly improved system reliability by 15% across all sectors, with a confidence interval of [10%, 20%]. Multilevel regression analysis provided robust insights into the determinants of Ugandan manufacturing plants' system reliability. Investments in automation should be prioritised to enhance system reliability and overall operational efficiency in Ugandan manufacturing sectors. multilevel regression, system reliability, Ugandan manufacturing plants, industrial performance The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Uganda, Multilevel Regression, System Reliability, Hierarchical Analysis, Statistical Modelling, Econometrics, Spatial Statistics*

ABSTRACT-ONLY PUBLICATION

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