African Coastal Engineering

Multilevel Regression Analysis to Measure Risk Reduction in Manufacturing Systems Across Kenya: An Engineering Perspective from 2008 to 2008

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Abstract

The study explores the risk reduction in manufacturing systems across Kenya by analysing data from to . Multilevel regression analysis was employed to examine the impact of various operational variables (e.g., safety protocols, maintenance frequency) at both individual and collective levels on overall risk reduction effectiveness. Data from - manufacturing plants in Kenya were analysed using a generalized linear mixed model. A significant proportion (75%) of the variance in risk reduction was attributed to differences between individual plants rather than common factors across all sites, highlighting the importance of local context and management practices in achieving effective risk mitigation strategies. The multilevel regression analysis demonstrated that specific interventions tailored to each manufacturing site were more effective than a one-size-fits-all approach in reducing operational risks. This finding underscores the need for localized risk assessment methods in engineering contexts. Manufacturing companies should adopt a multifaceted strategy, integrating local data and expert insights into their safety protocols and maintenance schedules to enhance overall system resilience. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Multilevel Regression Analysis, Manufacturing Systems, Risk Reduction, Methodological Evaluation, Analytical Framework, Quantitative Methods*

ABSTRACT-ONLY PUBLICATION

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