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Structural Integrity Assessment of Aging Infrastructure in Uganda: A Methodological Approach

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Abstract

Uganda's aging infrastructure faces significant structural integrity challenges due to prolonged exposure to environmental factors and inadequate maintenance. The study employs a combination of field inspections, non-destructive testing (NDT), and finite element analysis (FEA) to evaluate the condition of infrastructure components. A multivariate regression model is used to predict the remaining life expectancy of structures based on their initial condition and environmental exposure data. Field inspections revealed that 43% of bridges in Uganda exhibited critical damage, particularly at joints and connections, indicating a need for urgent structural assessments. The methodological framework developed provides a robust approach to assessing and managing the structural integrity of aging infrastructure in Uganda, enabling targeted interventions to prevent failures. Immediate investments should be prioritised on critical infrastructure components identified through this assessment process to ensure public safety and longevity. Structural Integrity Assessment, Aging Infrastructure, Non-Destructive Testing, Finite Element Analysis, Multivariate Regression The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Infrastructure, Aging, Assessment, Methodology, Structural, Durability*

ABSTRACT-ONLY PUBLICATION

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