African Structural Engineering

Structural Integrity Assessment of Aging Infrastructure in Uganda: A Comprehensive Study

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Abstract

The rapid urbanization and industrial development in Uganda have led to a significant increase in the construction of infrastructure such as bridges and buildings. However, these structures often face challenges due to their age and exposure to environmental factors. A combination of visual inspections, non-destructive testing (NDT), and finite element analysis (FEA) was employed to evaluate the condition of the structures. Data from these methods were analysed using statistical models and uncertainty quantification techniques. Visual inspections revealed a proportion of 30% structural damage in bridges, while buildings showed signs of aging with cracks at a direction predominantly along their longitudinal axis (lengthwise). The results indicate that the infrastructure in Uganda is under significant stress and requires immediate attention to prevent potential failures. Based on the findings, it is recommended that routine inspections be conducted every five years, and targeted repairs should be prioritised for structures showing signs of distress. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, Structural Health Monitoring, Non-Destructive Testing, Finite Element Analysis, Corrosion Assessment, Masonry Structure Analysis, Bridge Engineering*

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