African Food Process Engineering

Structural Integrity Assessment of Aging Infrastructure in Uganda

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Abstract

Infrastructure in Uganda, particularly bridges and buildings constructed prior to the mid-2000s, is aging and faces significant structural integrity challenges. A data-driven approach was employed, integrating historical records, condition assessments, and expert opinions to evaluate the current state of bridges and buildings across different regions of Uganda. Concrete samples from bridge piers showed an average compressive strength of 30 MPa with a standard deviation of 5 MPa, indicating significant variability in material quality over time. The findings highlight the urgent need for targeted maintenance and rehabilitation efforts to prevent potential failures of critical infrastructure components. Immediate action is required to implement regular inspections, enforce stricter construction standards, and allocate resources for necessary repairs and upgrades. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, Structural health monitoring, Non-destructive testing, Material degradation analysis, Life cycle assessment, Finite element modelling, Sustainability assessments*

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