



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

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Abstract

The structural integrity of aging infrastructure in Uganda is a critical concern, given the country's rapid urbanization and increasing population density. A mixed-method approach combining field surveys, finite element analysis (FEA), and expert assessments was employed to evaluate the structural performance of selected structures. The FEA revealed a significant variability in load-bearing capacities across different types of bridges and buildings, with some structures exceeding their design limits by up to 20%. The findings highlight the urgent need for targeted maintenance and upgrades to ensure public safety and longevity of infrastructure assets in Uganda. Immediate investment in structural integrity assessments and proactive maintenance programmes is recommended to mitigate risks associated with aging infrastructure. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geology, finite element analysis, historical cracking patterns, material fatigue, sustainability assessment, urbanization impacts, structural health monitoring*

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