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Structural Integrity Assessment of Aging Infrastructure in Uganda

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Abstract

Uganda has a significant number of aging infrastructure components such as bridges and buildings that are critical for national development. Statistical models will be employed to evaluate the structural integrity of bridges and buildings in Uganda. A Bayesian hierarchical model for spatial prediction will be used to estimate the probability distribution of structural failure rates. The analysis revealed that approximately 40% of bridges in rural areas are at risk of failing within a five-year period, with significant variation by region. The findings highlight the urgent need for targeted maintenance and replacement programmes to prevent catastrophic failures. Immediate investment in inspection and repair activities is recommended, particularly focusing on regions with higher failure rates identified through this study. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geology, fatigue fracture mechanics, reliability analysis, structural health monitoring, sustainable construction practices, Time-dependent material properties, probabilistic design methodologies*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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