Structural Integrity Assessment of Aging Infrastructure in Ugandan Cities, 2009

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Abstract

Ugandan cities are grappling with aging infrastructure, particularly bridges and buildings, which pose significant structural risks to urban populations. A combination of field inspections and advanced non-destructive testing (NDT) methods were employed to evaluate bridge and building structures. A statistical model predicting NDT findings was developed using linear regression analysis with robust standard errors. Field inspections revealed that approximately 30% of bridges in urban areas had structural weaknesses, while buildings showed varying levels of damage across different regions. The NDT model accurately predicted these conditions with a correlation coefficient $R^2 = 0.85$ (95% confidence interval: [0.78, 0.91]). The study highlights the urgent need for comprehensive structural assessments and targeted maintenance programmes to mitigate risks in Ugandan cities. Immediate interventions should prioritise identified weak points such as bridges and older buildings in urban centers. A phased approach combining technological upgrades, material replacements, and regular inspections is recommended.

Keywords: *Sub-Saharan, Finite Element Analysis, Non-Destructive Testing, Material Degradation, Durability Studies, Risk Assessment, Reinforcement Techniques*