



# Structural Integrity Assessment of Aging Infrastructure in Uganda

Grace Namugijja Mugenyi<sup>1</sup>, Ephraim Onyari Omoro<sup>2</sup>, Samuel Sembango Kasoa<sup>3</sup>, James Kizza Mbonye<sup>3</sup>

<sup>1</sup> Department of Mechanical Engineering, Kampala International University (KIU)

<sup>2</sup> Kampala International University (KIU)

<sup>3</sup> Makerere University Business School (MUBS)

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**Correspondence:** [gmugenyi@outlook.com](mailto:gmugenyi@outlook.com)

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## Author notes

*Grace Namugijja Mugenyi is affiliated with Department of Mechanical Engineering, Kampala International University (KIU) and focuses on Engineering research in Africa.*

*Ephraim Onyari Omoro is affiliated with Kampala International University (KIU) and focuses on Engineering research in Africa.*

*Samuel Sembango Kasoa is affiliated with Makerere University Business School (MUBS) and focuses on Engineering research in Africa.*

*James Kizza Mbonye is affiliated with Makerere University Business School (MUBS) and focuses on Engineering research in Africa.*

## Abstract

This study addresses a current research gap in Engineering concerning Structural Integrity Assessment of Aging Infrastructure (Bridges, Buildings) in Uganda in Uganda. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Structural Integrity Assessment of Aging Infrastructure (Bridges, Buildings) in Uganda, Uganda, Africa, Engineering, methodology paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. 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, Life cycle assessment, Non-destructive testing, Progressive failure modelling, Risk assessment, Sustainability assessment*

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