

Replication and Methodological Diagnostics of Municipal Infrastructure Asset Systems in Ghana

A Multilevel Regression Analysis (2000–2026)

Ama Serwaa Mensah¹, Kwame Asante¹

Accra Technical University

Correspondence: amensah@aol.com

Received: 09 January 2026 | Accepted: 18 March 2026 | Published: 03 May 2026 | DOI:

[10.5281/zenodo.18973205](https://doi.org/10.5281/zenodo.18973205)

ABSTRACT

Background: Municipal infrastructure asset management systems are critical for sustainable urban development in sub-Saharan Africa. Prior studies on their adoption have often relied on single-level analytical models, which may not adequately account for hierarchical data structures inherent in municipal governance.

Purpose and objectives: This replication study aims to re-evaluate the determinants of system adoption rates by implementing a rigorous multilevel regression analysis. The core objective is to conduct a methodological diagnostic of the analytical approach, testing the robustness of previously reported findings.

Keywords: *Municipal infrastructure, Asset management systems, Sub-Saharan Africa, Multilevel regression, Methodological replication, Ghana, Adoption rates*

Article Highlights

- Multilevel regression confirms technical staff increase adoption odds (OR: 2.45)
- Methodological diagnostics show lower intra-class correlation than original study
- Hierarchical data structure less influential than previously implied
- Study underscores necessity of model diagnostics in engineering systems analysis

Methodological Insight

The intra-class correlation coefficient was substantially lower than originally estimated, indicating municipality-level random effects explain less variation in adoption rates.

This replication study emphasizes rigorous model diagnostics alongside substantive findings.

ABSTRACT-ONLY PUBLICATION

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

REQUEST FULL PAPER

 **Email:** info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We
welcome your submissions!**

Join our community of African scholars and share
your groundbreaking work.

 **Submit at:** app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global
Knowledge