AFRICAN CIVIL ENGINEERING JOURNAL

WORKING PAPER

A Time-Series Forecasting Model for the Cost-Effectiveness of Municipal Infrastructure Asset Management Systems in Kenya, 2000–2026

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Received: 29 January 2008 | Accepted: 07 April 2008 | Published: 16 May 2008 | **DOI:** 10.5281/zenodo.18966393

ABSTRACT

Background: Municipal infrastructure asset management systems (MIAMS) in Kenya have been implemented with significant investment, yet systematic, longitudinal analysis of their cost-effectiveness is lacking. This gap hinders evidence-based policy and optimal resource allocation for critical urban engineering assets.

Purpose and objectives: This working paper develops and validates a time-series forecasting model to quantitatively evaluate the historical and projected cost-effectiveness of MIAMS. The objective is to provide a replicable methodological framework for engineering asset managers to predict future performance and justify investments.

Keywords: *Municipal infrastructure, Asset management, Cost-effectiveness, Time-series forecasting, Sub-Saharan Africa*

Article Highlights

- ARIMAX model quantifies historical and projects future cost-effectiveness of municipal asset systems.
- Forecast uncertainty widens beyond short term, indicating vulnerability to fiscal shocks.
- Provides a replicable technical framework for engineering asset managers to justify investments.
- Sustained capital expenditure is critical for realising projected efficiency gains.

Methodological Note

The model employs maximum likelihood estimation with robust standard errors to account for heteroskedasticity in the time-series data.

This paper presents a forecasting framework, not an evaluation of specific municipal programmes.