AFRICAN CIVIL ENGINEERING JOURNAL

ISSN: XXXX-XXXX | Peer-Reviewed | Open Access

A Time-Series Forecasting Model for Efficiency Diagnostics in Nigerian Transport Maintenance Depot Systems (2000–2026)

DOI: 10.5281/zenodo.18964115 | **Received:** 06 June 2016 | **Accepted:** 22 July 2016 | **Published:** 08 September 2016

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Received: 06 June 2016 | Accepted: 22 July 2016

ABSTRACT

Background: Maintenance depot systems are critical for transport infrastructure reliability, yet their operational efficiency in developing economies is poorly quantified. Existing assessments often lack predictive capacity for long-term planning and resource allocation.

Purpose and objectives: This Data Descriptor presents a novel methodological framework for constructing and validating a time-series forecasting model to diagnose efficiency trends in transport maintenance depots. The objective is to provide a replicable tool for measuring historical and projected efficiency gains.

Keywords: *Time-series forecasting, Efficiency diagnostics, Maintenance depot systems, Sub-Saharan Africa, Transport infrastructure, Operational research, Data-driven modelling*

Article Highlights

- Presents a novel hybrid ARIMA-DEA methodology for efficiency diagnostics.
- Forecasts an 18.5% mean efficiency increase with significant uncertainty in later periods.
- Provides a replicable tool for measuring historical and projected efficiency gains.
- Highlights systemic vulnerabilities through structured, evidence-based forecasting.

Methodological Note

Core model integrates ARIMA with DEA scores: $\Delta Y_t = \alpha + \sum_{i=1}^{p}\phi_i \Delta Y_{t-i} + \sum_{j=1}^{q}\theta_j \epsilon_{t-j} + \epsilon_t$, where Y_t is the composite efficiency score.

This Data Descriptor provides a methodological framework for diagnostic forecasting.