AFRICAN STRUCTURAL ENGINEERING

Methodological Evaluation and Risk Reduction Forecasting for Ethiopia's Power-Distribution Infrastructure, 2000–2026

Meklit Assefa[1] | Tewodros Kebede[1,2]

[1] *Addis Ababa Science and Technology University (AASTU)*
[2] *Department of Civil Engineering, Ethiopian Public Health Institute (EPHI)*

Correspondence: massefa@hotmail.com

ABSTRACT

Background: The reliability of power-distribution infrastructure is a critical determinant of economic development and social welfare. In Ethiopia, ageing assets and operational challenges have historically led to significant service interruptions and safety risks, necessitating a robust analytical framework for policy intervention.

Purpose and objectives: This policy analysis aims to methodologically evaluate the state of the nation's power-distribution equipment systems and to develop a forecasting model for quantifying the risk reduction achievable through targeted infrastructure investment and maintenance policies.

Keywords: *Power-distribution infrastructure, Sub-Saharan Africa, Risk assessment, Time-series forecasting, Asset management, Reliability engineering, Grid modernisation*

Article Highlights

- Forecasting model links infrastructure investment to quantifiable reductions in system-wide failure risk.
- Analysis identifies diminishing returns on investment beyond a specific policy threshold.
- Methodology provides an empirical basis for prioritising capital expenditure and maintenance.
- Framework supports long-term, data-driven planning for grid modernisation.

Core Forecasting Model

A generalised linear model with a logit link, estimated using maximum likelihood with robust standard errors: $\log(p/(1-p)) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

This analysis offers a novel tool for evidence-based infrastructure policy.

📄 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