African Geospatial Analysis (Technology/Methodology)

Time-Series Forecasting Model Evaluation for Cost-Effectiveness of Power-Distribution Equipment Systems in South Africa

Ndivhuo Ngcubu[1], **Mphumzi Dhlomo**[1,2], **Sipho Cele**[1,3]

[1] Cape Peninsula University of Technology (CPUT)

[2] Department of Civil Engineering, North-West University

[3] North-West University

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Correspondence: nngcubu@hotmail.com

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Author notes

Ndivhuo Ngcubu is affiliated with Cape Peninsula University of Technology (CPUT) and focuses on Engineering research in Africa.

Mphumzi Dhlomo is affiliated with Department of Civil Engineering, North-West University and focuses on Engineering research in Africa.

Sipho Cele is affiliated with North-West University and focuses on Engineering research in Africa.

Abstract

The field of engineering in South Africa has identified a need to evaluate the cost-effectiveness of power-distribution equipment systems over time. The methodology involves collecting historical data on power distribution costs and operational efficiency. A mixed-method approach is employed, including statistical analysis and sensitivity testing to ensure robustness. A significant proportion (75%) of the variance in equipment cost was explained by time-series forecasting models using ARIMA techniques with a 95% confidence interval around these estimates. The model demonstrates high accuracy in predicting future costs, which is crucial for informed decision-making and resource allocation in South African power distribution systems. Based on the findings, it is recommended that policy-makers utilise this forecasting tool to optimise investment strategies and enhance cost-effectiveness. Power Distribution Equipment, Cost-Effectiveness, Time-Series Forecasting, ARIMA Model, South Africa The maintenance outcome was modelled as $Y\{\}=beta 0+beta 1 X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, econometric, autoregression, VAR model, Monte Carlo simulation, stochastic process, forecasting assessment*

ABSTRACT-ONLY PUBLICATION

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