



Methodological Evaluation of Power-Distribution Equipment Systems in Senegal Using Time-Series Forecasting for Risk Reduction Analysis

Oumar Ngom¹, Mamadou Diallo^{2,3}, Seyni Sarr^{2,4}

¹ Institut Sénégalais de Recherches Agricoles (ISRA)

² Council for the Development of Social Science Research in Africa (CODESRIA), Dakar

³ African Institute for Mathematical Sciences (AIMS) Senegal

⁴ Department of Civil Engineering, Institut Sénégalais de Recherches Agricoles (ISRA)

Published: 17 April 2017 | Received: 21 January 2017 | Accepted: 27 March 2017

Correspondence: ongom@aol.com

DOI: [10.5281/zenodo.18704722](https://doi.org/10.5281/zenodo.18704722)

Author notes

Oumar Ngom is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Engineering research in Africa.

Mamadou Diallo is affiliated with Council for the Development of Social Science Research in Africa (CODESRIA), Dakar and focuses on Engineering research in Africa.

Seyni Sarr is affiliated with Department of Civil Engineering, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Engineering research in Africa.

Abstract

This study examines power-distribution equipment systems in Senegal, assessing their reliability and identifying areas for improvement. A comprehensive analysis was conducted, involving data collection from multiple sources, including historical records and field observations. Time-series forecasting techniques were applied to predict future system performance and identify potential risks. Monte Carlo simulations were used to assess the uncertainty of these predictions. The time-series model indicated that there is a significant proportion (60%) of equipment failures could be predicted with high accuracy, enabling proactive maintenance schedules. The findings suggest that integrating advanced forecasting models into routine maintenance practices can substantially reduce system downtime and improve overall reliability. Regular updates to the forecasting model should be implemented, along with training for maintenance personnel in using these tools effectively. Enhanced data collection from field operations is recommended to refine the model further. The maintenance outcome was modelled as $Y \{ \} = \beta_0 + \beta_1 X \{ \} + u_i + v \text{arepsilon} \{ \}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords:
African,

Geographic

Terms:
Sub-Saharan

Methodological
Modelling,

Forecasting,

Terms:
Analysis

*Theoretical
Reliability, Optimization*

Concepts:

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