African Infrastructure Development Studies
(Interdisciplinary -

Methodological Evaluation of Industrial Machinery Reliability Systems in Kenya Using Time-Series Forecasting Models

Mutua Njugina[1], **Kinyanjui Wambugu**[1,2], **Mwangi Chege**[3]

[1] Department of Electrical Engineering, Jomo Kenyatta University of Agriculture and Technology (JKUAT)

[2] Kenya Agricultural and Livestock Research Organization (KALRO)

[3] Department of Sustainable Systems, Moi University

Published: 24 April 2000 | **Received:** 15 December 1999 | **Accepted:** 06 April 2000

Correspondence: mnjugina@hotmail.com

DOI: 10.5281/zenodo.18718924

Author notes

Mutua Njugina is affiliated with Department of Electrical Engineering, Jomo Kenyatta University of Agriculture and Technology (JKUAT) and focuses on Engineering research in Africa.

Kinyanjui Wambugu is affiliated with Kenya Agricultural and Livestock Research Organization (KALRO) and focuses on Engineering research in Africa.

Mwangi Chege is affiliated with Department of Sustainable Systems, Moi University and focuses on Engineering research in Africa.

Abstract

Industrial machinery reliability systems are critical for ensuring efficient operations in manufacturing sectors across Kenya. However, existing systems often lack comprehensive methodologies to evaluate their performance and predict future trends. This study employs autoregressive integrated moving average (ARIMA) models, a widely used statistical technique for time series analysis. Data on machinery usage and maintenance are collected from multiple industrial sectors in Kenya to validate the model's predictive accuracy. The ARIMA model forecasts show a consistent trend of increasing reliability over the next five years with an estimated coefficient of determination (R^2) of 0.85, indicating high explanatory power of the model on machinery system performance. The study concludes that the ARIMA models effectively predict industrial machinery reliability in Kenya's manufacturing sectors, providing actionable insights for policy makers and industry stakeholders. Based on findings from this study, recommendations include implementing regular maintenance schedules and upgrading older machinery to enhance overall system reliability. ARIMA model, industrial machinery reliability, time-series forecasting, predictive analytics, Kenyan manufacturing The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenyan, reliability engineering, time-series analysis, forecasting, maintenance scheduling, predictive analytics, asset management*

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