



# Time-Series Forecasting Model Evaluation for Cost-Effectiveness Analysis in Industrial Machinery Fleets of Tanzania

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## Abstract

Industrial machinery fleets in Tanzania face challenges related to maintenance costs and operational efficiency, necessitating robust cost-effectiveness analysis (CEA). Current methods often lack precision and are not tailored to local conditions. The research employs a time-series forecasting model (e.g., ARIMA) with robust standard errors accounting for forecast uncertainty. Data from ten randomly selected factories were analysed over three years to ensure representativeness. A significant proportion (72%) of machinery failures could be predicted within one month, reducing maintenance costs by an average of £150 per machine per year (300). *The time – series forecasting model effectively estimates cost savings ^ operational improvements for Tanzania*.  $Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + \varepsilon_{it}$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, Time-Series, ARIMA, Monte Carlo, Simulation, Forecasting, Optimization*

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