African Land Degradation Studies (Environmental/Earth Science)

Time-Series Forecasting Model for Measuring System Reliability in Tanzanian Manufacturing Plants Systems

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Abstract

Manufacturing plants in Tanzania face challenges related to system reliability, leading to inefficiencies and increased operational costs. A time-series forecasting model was developed using ARIMA (AutoRegressive Integrated Moving Average) methodology. The model incorporates robust standard errors to account for uncertainty in the predictions. The forecasted data shows an upward trend in system performance, indicating a gradual improvement over the next 12 months with a confidence interval of ±5%. The time-series forecasting model effectively predicts future reliability levels, aiding in proactive maintenance and cost management strategies for Tanzanian manufacturing plants. Manufacturing plant managers should implement preventive maintenance schedules based on the forecasted data to enhance system reliability and reduce downtime. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Tanzania, Geographic Information Systems, System Dynamics, Time Series Analysis, Forecasting Models, Reliability Engineering, Econometrics*

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