African Equine Science (Agri/Animal Science)

Time-Series Forecasting Model for Assessing System Reliability in Field Research Stations in Tanzania

Kasamwa Mwiraria[1], **Mpongo Kiwuuhili**[2]

[1] State University of Zanzibar (SUZA)

[2] Mkwawa University College of Education

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Correspondence: kmwiraria@hotmail.com

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Author notes

Kasamwa Mwiraria is affiliated with State University of Zanzibar (SUZA) and focuses on Agriculture research in Africa. Mpongo Kiwuuhili is affiliated with Mkwawa University College of Education and focuses on Agriculture research in Africa.

Abstract

Field research stations in Tanzania are essential for agricultural development but often face challenges with system reliability due to environmental and operational fluctuations. An ARIMA (AutoRegressive Integrated Moving Average) model was employed to analyse historical data from two research stations in Tanzania. The model's parameters were estimated using maximum likelihood estimation with robust standard errors for uncertainty quantification. The ARIMA(1,0,1) model provided a direction of positive forecast accuracy (RSME = 5.2%) and accounted for approximately 75% of the total variance in system performance data. This study demonstrates that time-series forecasting models can effectively assess and predict system reliability in field research stations, contributing to sustainable agricultural development. The findings suggest implementing ARIMA-based monitoring systems at additional stations for enhanced reliability and efficiency in future research endeavors.

Keywords: *African savannahs, ARIMA, FAO, GIS, Monte Carlo simulation, SERC, TSSS*

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