



Methodological Evaluation of Field Research Stations Systems in Kenya: Time-Series Forecasting Model for Efficiency Gain Measurement

Oluoch Wanjiku¹

¹ Pwani University

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Correspondence: owanjiku@yahoo.com

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Author notes

Oluoch Wanjiku is affiliated with Pwani University and focuses on Computer Science research in Africa.

Abstract

Field research stations in Kenya play a crucial role in monitoring environmental changes and supporting policy development. However, their efficiency varies significantly due to varying methodologies and data collection practices. A comprehensive search of databases including Scopus, Web of Science, and Google Scholar was conducted. The review considered articles published between and focusing on methodologies and efficiency metrics used by these stations. The analysis revealed a significant variability in the effectiveness of different research station systems, with some showing gains up to 20% in data collection accuracy over time. A preliminary model suggests that increasing the frequency of data collection can lead to more efficient outcomes. This review highlights the importance of standardised methodologies and periodic performance evaluations for enhancing the efficiency of field research stations in Kenya. Research stations should adopt a consistent methodology based on best practices identified in this review, and their effectiveness could be further enhanced through regular time-series forecasting models to measure gains over time. Field Research Stations, Efficiency Measurement, Time-Series Forecasting, Methodological Evaluation Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{rVert}^2$, with performance evaluated using out-of-sample error.

Keywords: Kenya, Field Research Stations, Methodology, Evaluation, Time-Series Analysis, Forecasting, Efficiency Measurement

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