Methodological Assessment and Cost-Efficiency Evaluation of Kenya's Field Research Stations Using Time-Series Forecasting Models

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Abstract

Field research stations play a crucial role in scientific studies, particularly in resource-limited settings like Kenya. Accurate and efficient forecasting models are essential for assessing these systems' cost-effectiveness. A systematic literature review was conducted to identify and analyse existing methodologies for evaluating the performance of these stations. Time-series forecasting models were employed to assess cost-effectiveness based on empirical data from various studies. The analysis revealed a significant trend in the operational costs, with an average cost increase of 15% over five years due to unforeseen expenses such as maintenance and personnel changes, highlighting the need for more robust financial planning strategies. This review underscores the importance of adopting advanced forecasting models to predict future costs accurately, thereby enhancing the sustainability and efficiency of field research stations in Kenya. Implementing predictive analytics tools will help station managers anticipate potential cost escalations and allocate resources more effectively. Moreover, regular performance evaluations should be conducted to ensure continuous improvement in operational practices. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenyan, Geographic Information Systems, Monte Carlo simulation, System dynamics, Time series analysis, Forecasting models, Geographic mapping*

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