African Urban Geography (Geography/Social/Planning)

Time-Series Forecasting Model Evaluation in Ugandan Smallholder Farms Systems: A Methodological Approach to Cost-Effectiveness Analysis

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Abstract

Time-series forecasting models are increasingly used to predict agricultural productivity in smallholder farming systems, offering insights into cost-effectiveness and resource allocation. A rigorous evaluation of the time-series forecasting model was conducted using historical agricultural data from Ugandan smallholder farms. The analysis included model specification, parameter estimation, and validation through cross-validation techniques to ensure robustness and accuracy. The forecasted yield predictions showed a moderate correlation ($R^2 = 0.75$) with actual yields over the past five years, indicating that the model can effectively predict agricultural productivity in Ugandan smallholder farms. This study provides evidence supporting the use of time-series forecasting models for assessing cost-effectiveness and resource management strategies within smallholder farming systems. Further research should explore the integration of additional variables such as climate data to enhance predictive accuracy, thereby improving the model's utility in Ugandan agricultural contexts. Agricultural productivity, Time-series forecasting, Smallholder farms, Cost-effectiveness analysis, Uganda The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, econometrics, time-series, forecasting, intervention analysis, geospatial, resource allocation*

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