



Methodological Evaluation and Time-Series Forecasting in Ugandan Smallholder Farms Systems: Assessing System Reliability

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Abstract

The reliability of smallholder farms systems in Uganda is critical for sustainable agricultural development. A meta-analysis was conducted using multiple studies from Ugandan smallholder farms. Time-series forecasting models were applied to assess the stability of these systems over time. The average annual growth rate in farm productivity varied by as much as 5% between different methods, indicating variability in reliability estimates. Despite methodological differences, all models showed significant improvement in system reliability over five-year periods. Further research should focus on validating these forecasting models across diverse ecological conditions and farming practices. Meta-analysis, time-series forecasting, Ugandan smallholder farms, system reliability The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, smallholder agriculture, meta-analysis, time-series modelling, reliability assessment, econometrics, stochastic processes*

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