



Methodological Evaluation of Senegalese Smallholder Farm Systems through Time-Series Forecasting Models

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Abstract

Smallholder farming systems in Senegal are pivotal to the nation's agricultural productivity and rural economy. Despite their importance, these systems often operate under resource constraints and exhibit variability over time. The research employs a time-series forecasting model, specifically an autoregressive integrated moving average (ARIMA) model, to analyse monthly production data from to . ARIMA is chosen for its robustness in handling non-stationary and seasonal data. A significant proportion of farms showed a positive trend in productivity over the analysed period, with an average increase of 5% in output per year. The time-series forecasting model demonstrates potential as a tool for measuring efficiency gains in Senegalese smallholder farming systems, offering insights into resource allocation and policy interventions. Policy makers should consider leveraging the findings to develop targeted agricultural support programmes that address identified productivity trends. The empirical specification follows $Y = \beta_{0+\beta} \vec{p} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, Senegalese smallholders, quantitative methods, qualitative methods, econometric analysis, sustainability assessment, rural development*

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