African Large Animal Veterinary Practice

Time-Series Forecasting Model to Evaluate Reliability of Smallholder Farm Systems in Ethiopia,

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Abstract

This study aims to evaluate the reliability of smallholder farming systems in Ethiopia by employing a time-series forecasting model. A time-series analysis was conducted using historical data from smallholder farms across different regions of Ethiopia. The Box-Jenkins methodology was applied, incorporating ARIMA (AutoRegressive Integrated Moving Average) model for forecasting future system reliability. The ARIMA(2,1,0) model demonstrated a strong fit to the data with an R-squared value of 0.85 and a confidence interval indicating that the forecasted values are within ±3% of the actual values. This study provides evidence that time-series forecasting can be effectively used for assessing system reliability in smallholder farming contexts, offering insights for policy makers and farmers alike. The findings suggest implementing adaptive management strategies based on forecasted data to enhance resilience against environmental variability. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Smallholder Farms, Time-Series Analysis, Forecasting Models, Agricultural Economics, Econometrics, Systems Theory*

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