



# Time-Series Forecasting Model for Evaluating Efficiency Gains in Ethiopian Field Research Stations Systems

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## Abstract

Field research stations in Ethiopia are critical for agricultural development and policy-making. However, their operational efficiency can be improved through better resource management. A time-series forecasting model was applied to historical data from Ethiopian field research stations, focusing on operational costs and output metrics. Over the past five years, there has been an upward trend in research station outputs, indicating potential for increased efficiency. However, cost fluctuations have remained relatively stable. The time-series model suggests that adopting more efficient resource allocation strategies could lead to significant gains in output without substantial increases in costs. Implementing predictive maintenance and optimising supply chain logistics are recommended to enhance operational efficiencies. Model estimation used  $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda lVert\theta rVert^2$ , with performance evaluated using out-of-sample error.

**Keywords:** *African geography, Time-series analysis, Econometrics, Forecasting models, Efficiency metrics, Data mining, Spatial econometrics*

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