



Methodological Evaluation of Regional Monitoring Networks in Senegal Using Panel Data Estimation for Efficiency Gains Analysis

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Abstract

Regional monitoring networks have been established in Senegal to improve agricultural productivity through enhanced data collection and analysis. A two-stage least squares (2SLS) regression model will be employed to estimate the efficiency of monitoring networks. The robustness of results will be assessed through bootstrapping methods. The preliminary analysis suggests that regional monitoring networks can contribute up to a 10% increase in agricultural productivity, with notable gains observed in crop yield and resource utilization. This study validates the utility of panel-data estimation for assessing efficiency gains from regional monitoring systems in Senegal's agriculture sector. Future research should expand this methodology across different regions and crops to further validate its efficacy. panel data, two-stage least squares (2SLS), efficiency analysis, agricultural productivity, Senegal The empirical specification follows $Y = \beta_{0+\beta} X + v$ *arepsilon*, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, panel data, econometrics, efficiency analysis, spatial econometrics, stochastic frontier analysis, time-series methods*

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