African Physical Geography (Pure - Earth Science)

Methodological Evaluation of Smallholder Farm Systems in Senegal Using Quasi-Experimental Design to Measure Efficiency Gains

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Abstract

Smallholder farming systems in Senegal are characterized by resource constraints and variability, necessitating rigorous methodological approaches to assess efficiency gains. A quasi-experimental design, incorporating regression discontinuity analysis (RDA), will be employed to measure the impact of targeted interventions on efficiency gains. Data from Senegalese farmers' cooperatives will be analysed using RDA models to estimate causal effects with robust standard errors. Regression discontinuity analysis revealed significant improvements in farm efficiencies, attributable to specific agricultural subsidies and training programmes implemented by cooperative organizations. The quasi-experimental design provided evidence of measurable efficiency gains among smallholder farmers, highlighting the effectiveness of targeted interventions. Further research should explore long-term impacts and scalability of these interventions across different regions in Senegal. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African, Quasi-experimental, Methodology, Efficiency, Smallholder, Resource, Evaluation*

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