



# Methodological Evaluation of Smallholder Farm Systems in Senegal Using Difference-in-Differences for Efficiency Measurement

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## Abstract

Smallholder farms in Senegal face challenges in achieving optimal productivity and efficiency. A Difference-in-Differences approach was applied to assess the impact of various interventions and management practices on productivity among smallholder farmers. The study utilised a control group and treatment groups to measure changes over time. The DiD model revealed significant efficiency gains in treated farms compared to controls, with an estimated increase of 20% in output per hectare after the intervention period. The findings suggest that targeted interventions can effectively enhance agricultural productivity among smallholder farmers in Senegal. Further research should explore the scalability and sustainability of these interventions across different regions and contexts within Senegal. The empirical specification follows  $Y = \beta_{0+\beta}^{\rightarrow} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African geography, smallholder farming, productivity measurement, econometrics, efficiency analysis, intervention studies, agricultural development*

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