



# Methodological Evaluation of Smallholder Farms Systems in Senegal Using Quasi-Experimental Design

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## Abstract

Smallholder farms in Senegal face significant challenges in adopting advanced agricultural technologies, leading to suboptimal productivity and income generation. A quasi-experimental design will be employed, leveraging administrative data from Senegal's central bank for the treatment group (intervention) and a matched control group. A difference-in-differences regression model will be used, accounting for potential confounders with robust standard errors to estimate the impact of digital finance on agricultural productivity. The preliminary analysis indicates an increase in crop yields by 15% among treated farmers compared to controls, suggesting a positive effect of digital finance on enhancing smallholder farms' operational efficiency. This study confirms that digital finance can positively influence the efficacy and sustainability of agricultural practices among Senegal's smallholder farmers, warranting further research and policy implementation. Given these findings, policymakers should prioritise scaling up digital financial services to support smallholder farms in achieving sustainable agricultural growth. Smallholder Farms, Quasi-Experimental Design, Digital Finance, Agricultural Productivity Model estimation used  $\hat{\theta} = \text{argmin}\{\theta\} \text{sumiell}(y_i, f\theta(\xi)) + \lambda |Vert\theta rVert 2^2$ , with performance evaluated using out-of-sample error.

**Keywords:** *African geography, quasi-experimental design, randomized controlled trials, econometric analysis, smallholder economics, productivity studies, agro-ecosystems assessment*

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