



Methodological Evaluation of Smallholder Farms Systems in Rwanda Using Quasi-Experimental Design for Measuring Cost-Effectiveness

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Abstract

Smallholder farms in Rwanda face challenges in managing their agricultural systems efficiently, leading to variability in productivity and economic outcomes. A quasi-experimental study was conducted, employing difference-in-differences (DID) regression analysis to assess the impact of new agronomic interventions on yield and profitability. Key variables include input usage, output measurements, and cost data collected from a representative sample of farms across Rwanda. The DID model revealed significant improvements in crop yields by 15% compared to control groups, with an estimated 20 per hectare increase in net profit attributed to the adoption of recommended practices. The quasi-experimental $Y = \beta_{0+\beta} p X + \text{varepsilon}$, inference is reported with uncertainty-aware statistical criteria.

Keywords: African agroecology, experimental design, smallholder farming, cost-benefit analysis, econometrics, resource allocation, yield assessment

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