African Climate Change Impacts & Adaptation (Interdisciplinary - incl

Methodological Assessment and Adoption Rates in Smallholder Farm Systems Using Difference-in-Differences Approach in Rwanda

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Abstract

This study examines methodological challenges in assessing adoption rates of renewable energy technologies among smallholder farmers in Rwanda. A mixed-methods study design combining quantitative DID econometric analysis with qualitative interviews was employed to gather comprehensive data on smallholder farm practices in Rwanda. In a sample of 120 smallholder farms, the DID model revealed an adoption rate of renewable energy technologies at 45%, with significant differences observed between those under experimental intervention and control groups. Interviews identified key barriers such as financial constraints and lack of technical support. The difference-in-differences approach proved robust in measuring technology uptake but requires further refinement for more nuanced understanding of adoption dynamics. Future studies should consider incorporating additional qualitative data to complement the quantitative findings, enhancing the interpretability of results. The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Rwanda, Smallholder, Mixed-Methods, Adoption, Methodology, Evaluation, Difference-in-Differences, GIS*

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