



Methodological Evaluation of Smallholder Farm Systems in Uganda Using Multilevel Regression Analysis for Adoption Rates Assessment

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Abstract

Smallholder farming systems in Uganda face various challenges related to resource management and adoption of modern agricultural practices. The study employed multilevel regression analysis to examine the factors influencing the adoption of conservation agriculture techniques in Ugandan smallholder farms. Data were collected through structured interviews and field observations across different geographical regions. Multilevel regression revealed significant differences in adoption rates among farmers from varying socio-economic backgrounds, with a proportion of 45% adopting improved farming practices compared to those practicing traditional methods. The multilevel regression analysis provided insights into the effectiveness of targeted interventions for increasing agricultural productivity and sustainability. Future studies should consider longitudinal data collection to better understand long-term adoption trends and evaluate the impact of farmer training programmes on practice adoption. The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, smallholder farming, multilevel models, regression analysis, resource management, agricultural practices, adoption rates*

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