Methodological Evaluation of Smallholder Farms Systems in Rwanda: Multilevel Regression Analysis for Adoption Rates

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Abstract

Smallholder farming systems in Rwanda have undergone significant changes over time, influenced by various socio-economic factors. The research employs longitudinal data from a sample of smallholder farms in Rwanda over two years, applying multilevel logistic regression models to account for nested structure within farms and villages. A key finding is that the proportion of farmers adopting improved crop varieties increased by 20% compared to -, with significant variation across different regions. The multilevel regression analysis reveals the complex interplay of socio-economic factors influencing adoption rates at both farm and village levels. Policy recommendations include targeted interventions for villages with lower adoption rates to accelerate modernization processes among smallholder farmers. The empirical specification follows $Y = \vec{\beta}_{0+\beta} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Smallholder, Multilevel, Regression, Analysis, Adoption, Impact*

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