Multilevel Regression Analysis for Measuring Adoption Rates in Smallholder Farms Systems in Uganda: A Methodological Evaluation

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Abstract

The adoption of agricultural technologies in smallholder farms systems is often studied through regression analysis to understand the factors influencing their uptake. A multilevel logistic regression model was applied to data collected from surveys of over 200 smallholder farms across Uganda. The analysis accounts for both farm-level (e.g., farmer characteristics) and village-level (e.g., community support structures) effects. The multilevel model showed significant differences in adoption rates between villages, with a coefficient indicating that the presence of formal extension services increased the likelihood of adoption by 15% per village. This study provides robust evidence for the effectiveness of formal extension services in promoting agricultural technology adoption among smallholder farmers in Uganda. Given the positive findings, it is recommended to increase funding and resources for extension services aimed at supporting smallholder farmers' technological uptake. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

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