



Bayesian Hierarchical Models in Evaluating Adoption Rates of Smallholder Farming Systems in Ethiopia,

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Abstract

Smallholder farming systems in Ethiopia have seen varying adoption rates of modern agricultural practices. A systematic review was conducted to analyse existing studies on smallholder farming in Ethiopia. Quantitative data from multiple sources were synthesized using a Bayesian hierarchical model approach to assess regional differences in adoption rates and identify key influencing factors. Bayesian hierarchical models revealed significant variations in adoption rates across regions, with some areas showing adoption levels as high as 70% for certain practices. The use of Bayesian hierarchical models provided nuanced insights into the heterogeneous adoption patterns among smallholder farmers in Ethiopia. Future research should focus on understanding and addressing the specific challenges faced by different regions to enhance overall adoption rates. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Ethiopia, Smallholder Agriculture, Bayesian Methods, Hierarchical Modelling, Adoption Rates, Quantitative Research, Methodological Evaluation

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