



# Methodological Evaluation of Smallholder Farms Systems in Ethiopia Using Panel Data for Adoption Rate Measurement

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## Abstract

Smallholder farmers in Ethiopia face challenges in adopting new agricultural technologies and practices. The study utilised a mixed-method approach combining quantitative panel data from 120 smallholder farms across four regions in Ethiopia over two years. Panel data regression models were employed to estimate the impact of socio-economic and environmental variables on adoption rates. A significant proportion (45%) of farmers adopted improved farming systems, with higher adoption rates observed among those who received training or had access to credit facilities. The study highlights the importance of targeted interventions such as farmer education and financial support in increasing agricultural productivity among smallholders in Ethiopia. Policy makers should prioritise funding for extension services and microfinance programmes aimed at enhancing the adoption of modern farming technologies by smallholder farmers. The empirical specification follows  $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African Agriculture, Smallholder Farming, Panel Data Analysis, Methodological Evaluation, Agricultural Technology Adoption, Quantitative Research, Geographic Information Systems*

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