



Climate-Smart Agriculture and Its Impact on Smallholder Productivity in Kenya: An Empirical Study

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Abstract

Climate-smart agriculture (CSA) is a strategy designed to enhance agricultural productivity while reducing greenhouse gas emissions and improving resilience against climate change impacts. A mixed-methods approach combining quantitative surveys with qualitative interviews was employed. The survey used a structured questionnaire to collect data from 200 randomly selected farmers. Findings suggest that CSA adoption increased maize yields by an average of 15% compared to non-CSA practices, and cassava productivity improved by 8%. The study concludes that CSA significantly boosts smallholder agricultural output in Kenya, highlighting the need for policy support to scale up these practices. Recommendations include government investment in CSA training programmes and extension services to enhance farmer participation. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African climates, smallholder farming, climate change adaptation, sustainable intensification, agroecology, GIS applications, participatory rural appraisal*

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