



Adoption Rates and Success Metrics of Smart Farming Equipment among Kenyan Smallholder Farms: A Comparative Analysis

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Abstract

Smart farming technologies are increasingly being adopted by smallholder farmers in Kenya to improve productivity and efficiency. A mixed-methods approach combining quantitative surveys with qualitative interviews was employed to collect data from a representative sample of smallholder farmers in Kenya. Smart farming equipment adoption rates varied significantly among different regions in Kenya, with an average adoption rate of 35% across all farms surveyed. Notably, those using precision irrigation systems reported yield improvements of up to 20%, indicating their effectiveness in enhancing agricultural productivity. The findings suggest that while smart farming technologies offer significant potential benefits, there is a need for targeted dissemination strategies and support programmes to ensure wider adoption among Kenyan smallholder farmers. Investment should be directed towards developing localized training programmes and financial incentives to facilitate the uptake of these technologies by smallholders. Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n \text{sumiell}(y_i, f\theta(\xi)) + \lambda \text{Vert}\theta\text{rVert}^2 \}$, with performance evaluated using out-of-sample error.

Keywords: African agriculture, GIS, IoT, precision farming, rural development, data analytics, participatory evaluation

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