Methodological Evaluation of Smallholder Farms Systems in Uganda: A Randomized Field Trial for Cost-Effectiveness Assessment

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Abstract

Smallholder farms in Uganda face challenges in achieving cost-effectiveness due to resource limitations. A randomized field trial was conducted with 150 randomly selected plots of land. Data collection included input usage (seed, fertilizer), output measurements (yield, quality), and cost records over two growing seasons. Statistical analysis used linear regression to model the relationship between inputs and outputs, accounting for standard errors. The study found that a specific combination of fertilizer application significantly increased yield by an average of 20% with no increase in costs, indicating a cost-effective strategy. The randomized field trial demonstrated the potential to reduce farming costs while improving productivity. The statistical model revealed a robust relationship between inputs and outputs, providing evidence for optimising smallholder farms. Smallholders should consider adopting the recommended fertilizer application strategy to enhance their systems' cost-effectiveness and sustainability. cost-effectiveness, randomized field trial, smallholder farming, linear regression 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.

Keywords: *Sub-Saharan, Agricultural, Econometrics, Systems, Randomization, Experimental, Resource, Nutrition*

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