African Social Geography (Geography/Social)

Methodological Foundations for Evaluating Cost-Effectiveness in Smallholder Farm Systems: A Randomized Field Trial in Kenya

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Abstract

The evaluation of cost-effectiveness in smallholder farm systems is critical for enhancing agricultural productivity and sustainability in resource-limited environments such as Kenya. A key component involves the application of a linear regression model to analyse data from the randomized trial, accounting for potential confounding variables such as climate and soil type. The model is represented by $Y = beta0 + beta1 X_1 + \varepsilon$, where Y represents yield outcomes, X1 denotes input costs, and ε accounts for measurement errors with a standard deviation of 5%. This study provides essential insights for policymakers and agricultural practitioners aiming to improve the efficiency and sustainability of smallholder farming systems in Kenya. The findings underscore the importance of integrating organic inputs into farm management strategies. Future research should validate these results across different climatic regions and soil types to ensure broad applicability.

Keywords: *African geography, Smallholder farming, Cost-benefit analysis, Randomization, Experimental design, Sustainability metrics, Resource allocation models*