



Methodological Evaluation of Smallholder Farm Systems in Ethiopia Using Quasi-Experimental Design for Cost-Effectiveness Measurement

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Abstract

Smallholder farming systems in Ethiopia face challenges related to productivity and sustainability. A quasi-experimental study was conducted using data from 100 randomly selected farms across Ethiopia. Farms were divided into three groups: Group A implemented new irrigation techniques, Group B received training in soil conservation, and Group C served as the control group. Group A demonstrated a significant increase of 25% in crop yield compared to the control group (Group C), with an average cost-effectiveness ratio of 40 per unit of increased yield. Group B showed no statistically significant change in yields but had lower costs as $Y = \beta_0 + \beta_1 X + \text{varepsilon}$, inference is reported with uncertainty – aware statistical criteria.

Keywords: African geography, smallholder agriculture, quasi-experimental design, cost-effectiveness analysis, resource management, sustainability indicators, econometrics

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