



Methodological Evaluation of Smallholder Farm Systems in Tanzania: Panel Data Estimation for Efficiency Gains,

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Abstract

This study aims to evaluate the efficiency of smallholder farm systems in Tanzania through a methodological approach. A mixed-methods approach combining econometric analysis and qualitative interviews will be used. Panel data from - will be analysed using a stochastic frontier production function (SFPF) model. Panel-data analysis revealed significant variations in efficiency levels across different regions, with some farmers achieving up to 30% improvement over the study period. The findings suggest that targeted interventions can significantly boost agricultural productivity and resource utilization among smallholder farmers in Tanzania. Policy makers are encouraged to implement targeted training programmes and subsidies for high-efficiency farms, thereby improving overall agricultural performance in the country. The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, econometrics, efficiency measurement, panel data analysis, smallholder farming, productivity enhancement, rural development*

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