African Forest Policy and Economics
(Forestry/Environmental Policy)

Replication Study on Off-Grid Communities Systems in South Africa: Reassessment of Panel Data for System Reliability Assessment

Sipho Makhene[1,2], **Mpho Moloi**[1,3]

[1] Graduate School of Business, UCT

[2] Council for Geoscience

[3] Department of Soil Science, Council for Geoscience

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Correspondence: smakhene@gmail.com

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Author notes

Sipho Makhene is affiliated with Graduate School of Business, UCT and focuses on Agriculture research in Africa.
Mpho Moloi is affiliated with Graduate School of Business, UCT and focuses on Agriculture research in Africa.

Abstract

This study addresses a current research gap in Agriculture concerning Methodological evaluation of off-grid communities systems in South Africa: panel-data estimation for measuring system reliability in South Africa. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of off-grid communities systems in South Africa: panel-data estimation for measuring system reliability, South Africa, Africa, Agriculture, replication study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Agricultural, Econometrics, Pollard, Trend, Sustainability, Panel*

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