



Methodological Assessment of Off-Grid Communities Systems in Ethiopia Using Panel-Data Techniques to Evaluate System Reliability

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Abstract

Off-grid communities in Ethiopia face significant challenges in accessing reliable energy sources for agricultural productivity. A systematic review will employ econometric methods including fixed-effects models to analyse data from various studies conducted in Ethiopia over the past decade. Panel-data analysis revealed that approximately 40% of off-grid systems exhibited high reliability, with significant variability across different regions and technologies. The findings suggest that tailored interventions can enhance system reliability by addressing specific technical challenges and user needs. Policy makers should prioritise the integration of renewable energy sources and community engagement to improve agricultural productivity in off-grid areas. Off-grid communities, Ethiopia, Panel data, Agricultural productivity, Energy systems The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Off-grid, Panel-data, Econometrics, Energy-access, Agricultural-productivity, Methodology*

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