



Adoption Dynamics of Renewable Energy Microgrids Among Rural Ethiopian Farmers: A Comparative Analysis

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Abstract

Rural areas in Ethiopia face significant challenges related to energy access, particularly in northern regions where farmers rely on traditional sources for lighting and power. The research employs a mixed-methods approach combining surveys with in-depth interviews. Data is collected from five northern regions of Ethiopia, focusing on farmer perceptions and experiences with renewable energy solutions. Renewable energy microgrids are gaining traction among farmers, with adoption rates varying across different regions. In one region, 45% of surveyed households have adopted solar-powered irrigation systems, highlighting the potential for improving agricultural efficiency and sustainability. The study concludes that while renewable energy solutions show promise in rural Ethiopia, there is a need to address financial barriers and enhance community engagement for broader adoption. Policy makers should consider offering subsidies or financing schemes to support farmers who are willing but financially constrained. Community-based initiatives can also foster greater uptake by involving local leaders and influencers.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Renewable Energy, Microgrid, Adoption Theory, Sustainability Models, Community Engagement*

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