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Methodological Assessment of Off-Grid Communities Systems in Rwanda: A Randomized Field Trial for Yield Measurement

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Abstract

Off-grid communities in Rwanda face challenges accessing sustainable energy sources, impacting their agricultural productivity. A randomized field trial was conducted to measure the yield impact of off-grid community systems in Rwanda. Participants were randomly assigned to use solar-powered irrigation systems, while others continued with traditional methods. Slightly over 40% of participants reported increased yields when using solar-powered irrigation compared to their baseline yields, though variability exists across different regions and seasons. The study validates the effectiveness of solar-powered irrigation in enhancing agricultural productivity among off-grid communities in Rwanda. Further research should be conducted to optimise system design and ensure long-term sustainability for these communities. Off-Grid Communities, Solar-Powered Irrigation, Yield Improvement, Randomized Field Trial The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Rwanda, Geographic Information Systems (GIS), Participatory Monitoring and Evaluation (PME), Randomized Controlled Trials (RCTs), Sustainable Energy Access, Community-Based Management, Yield Measurement Techniques*