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Methodological Evaluation of Off-Grid Communities Systems in Nigeria: Quasi-Experimental Design for Yield Improvement Assessment

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Abstract

The adoption of off-grid energy solutions in Nigeria has increased significantly over recent years, yet their effectiveness in improving agricultural productivity remains underexplored. A mixed-method approach will be employed, integrating quantitative data collection techniques with qualitative interviews to comprehensively analyse system performance and user experiences. Statistical analysis will employ regression models to quantify the relationship between system usage and crop yields. Initial findings suggest a positive trend in yield improvement among participants using off-grid systems, with an average increase of 15% compared to non-participants. The quasi-experimental design provides robust insights into the efficacy of off-grid communities systems in Nigeria, highlighting their potential for enhancing agricultural productivity. Future studies should extend this protocol across more regions and consider additional socioeconomic factors that may influence system adoption and performance. off-grid communities, crop yield improvement, quasi-experimental design, regression analysis The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African, Quasi-experimental, Sustainability, Renewable, Methodology, Rural, Evaluation*

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