African Supply Chain Management

Bayesian Hierarchical Model Assessment for Off-Grid Community Systems Reliability in Kenya

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Abstract

This study examines off-grid community systems in Kenya, focusing on their reliability over a specific period. A Bayesian hierarchical model was applied to analyse data from off-grid community systems in Kenya, focusing on both quantitative and qualitative aspects. The model accounts for variability within and between different communities, providing robust estimates of system reliability. The analysis revealed that the proportion of systems operating reliably ranged from 65% to 78%, with significant variation across different geographical regions and socio-economic conditions. The Bayesian hierarchical model effectively captured the complexity of off-grid community systems in Kenya, offering a nuanced understanding of their reliability. Future research should consider expanding this analysis to include additional variables for enhanced accuracy. Recommend further investigation into the impact of system design and maintenance practices on overall reliability, as well as exploring potential improvements through technological advancements or policy interventions. Bayesian hierarchical model, off-grid systems, community reliability, Kenya Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Kenyan, Bayesian, Hierarchical, Model, Reliability, Off-Grid, Methodology*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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