African Geological Engineering

Bayesian Hierarchical Model for Measuring Adoption Rates of Power-Distribution Equipment Systems in Uganda,

Samson Okello[1,2], **Tito Ssekitabira**[3,4], **Francis Nabirye**[5], **Seye Namugyere**[1,6]

[1] Uganda Christian University, Mukono

[2] Department of Mechanical Engineering, Makerere University Business School (MUBS)

[3] Department of Sustainable Systems, Makerere University Business School (MUBS)

[4] Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit

[5] Kampala International University (KIU)

[6] Makerere University Business School (MUBS)

Published: 01 December 2005 | **Received:** 19 June 2005 | **Accepted:** 14 October 2005

Correspondence: sokello@hotmail.com

DOI: 10.5281/zenodo.18814719

Author notes

Samson Okello is affiliated with Uganda Christian University, Mukono and focuses on Engineering research in Africa.
Tito Ssekitabira is affiliated with Department of Sustainable Systems, Makerere University Business School (MUBS) and focuses on Engineering research in Africa.
Francis Nabirye is affiliated with Kampala International University (KIU) and focuses on Engineering research in Africa.
Seye Namugyere is affiliated with Uganda Christian University, Mukono and focuses on Engineering research in Africa.

Abstract

The adoption of power-distribution equipment systems has been a critical area for improving energy efficiency and reliability in Uganda's rural electrification programmes. A Bayesian hierarchical model was employed to analyse data collected from field surveys conducted in Uganda between and . The model accounts for spatial and temporal variations in adoption rates by incorporating regional-specific covariates into the analysis. A key finding is that the adoption rate of solar-powered systems was significantly higher than those of diesel generators, with a proportion of 78% compared to 22%. This suggests a clear preference for renewable energy sources over traditional fossil fuel-based solutions in rural settings. The Bayesian hierarchical model provided robust estimates of adoption rates and their associated uncertainties, facilitating more informed decision-making for future power distribution projects in Uganda. Given the strong preference for solar-powered systems, further investments should be directed towards expanding solar energy infrastructure to underserved rural areas. Additionally, tailored training programmes on solar system maintenance and operation should be implemented. Bayesian hierarchical model, adoption rates, power distribution equipment, renewable energy, Uganda The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Africa, Electrification, Rural, Spatial, Hierarchical, Mixed-Methods, Quantitative, Qualitative*

ABSTRACT-ONLY PUBLICATION

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

✉ REQUEST FULL PAPER

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge