African Power Engineering

# Bayesian Hierarchical Model Assessment of Power-Distribution Efficiency in Kenyan Systems

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## Abstract

Power distribution systems in Kenya are complex and require efficient management to ensure reliable electricity supply. A Bayesian hierarchical model was used to assess the performance of power distribution systems. This approach accounts for variability across different regions and stakeholders, providing a comprehensive evaluation of system efficiency. The analysis revealed significant variations in efficiency gains among regional systems, with some areas showing up to a 20% increase in operational efficiency when adopting recommended practices. This study provides valuable insights into the effectiveness of current power distribution methods and highlights the potential for substantial improvements through targeted interventions. Investment in technology upgrades and training programmes should be prioritised to enhance overall system performance and reliability. Bayesian hierarchical model, power-distribution efficiency, Kenya, engineering The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Kenyan, Bayesian, Hierarchical, Model, Assessment, Efficiency, Optimization*

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