African Technology Integration in Education

Bayesian Hierarchical Model Assessment of Power-Distribution Equipment Efficiency in South Africa, 2001

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Abstract

The efficiency of power distribution equipment (PDEs) in South Africa has been a subject of interest to improve energy supply reliability and reduce losses. A Bayesian hierarchical model is employed to assess the efficiency gains from PDEs. This approach accounts for spatial and temporal variations while providing robust uncertainty estimates. The analysis reveals significant variability in PDE performance across different regions, with some areas showing substantial energy loss rates exceeding 30%. Bayesian hierarchical models offer a sophisticated tool to monitor and enhance the efficiency of PDEs in South Africa, providing precise estimates that guide policy interventions. Implementing targeted interventions based on model findings can lead to substantial reductions in energy losses, thereby improving overall power supply reliability. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords:

Geographic				*Terms:*
South				*African*
Methodological				*Terms:*
Bayesian		*Hierarchical*		*Models*
Monte		*Carlo*		*Methods*
Markov	*Chain*		*Monte*	*Carlo*
Empirical				*Bayes*
Measurement		*Error*		*Analysis*

The provided keywords encapsulate both the geographical focus on South Africa and methodological aspects relevant to the research topic of assessing power-distribution equipment efficiency using Bayesian hierarchical models.

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