



Methodological Assessment of Power-Distribution Equipment Systems in Senegal: Quasi-Experimental Design for System Reliability Evaluation

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Abstract

Power distribution equipment systems are critical for reliable electricity supply in Senegal. However, there is a need to assess and improve their performance through methodological rigor. A quasi-experimental design was employed to measure system reliability, incorporating detailed data collection from field surveys and statistical analysis. The preliminary results indicate that the distribution efficiency varied by up to 20% across different regions of Senegal, with urban areas generally performing better than rural ones. The quasi-experimental design successfully highlighted regional disparities in system reliability, providing a foundation for targeted improvements and policy recommendations. Investigate the specific factors contributing to these variations and implement tailored interventions to enhance overall distribution efficiency in Senegal. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \text{varepsilon}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, reliability engineering, power systems, statistical testing, data analysis, geographic information systems, simulation modelling*

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