



Methodological Assessment and Panel Data Estimation of Power-Distribution Equipment Systems in South Africa

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Abstract

South Africa faces challenges in power-distribution equipment systems (PDES), with inadequate data on their adoption rates. The study employs a mixed-methods approach, integrating qualitative insights with quantitative panel-data estimation techniques. Panel data revealed that the adoption rate of PDES in rural areas is approximately 30%, indicating significant disparities. PDES systems are essential for enhancing power supply reliability and stability across South Africa. Policy makers should prioritise investment in rural infrastructure to improve access to PDES technologies. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African geography, power-distribution systems, panel data, econometrics, qualitative methods, technological adoption, spatial analysis

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