African Renewable Energy Engineering

Methodological Evaluation of Power-Distribution Equipment Systems in Kenya Using Difference-in-Differences to Measure Efficiency Gains

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Abstract

Power distribution equipment systems (PDES) play a critical role in ensuring reliable electricity supply to consumers in Kenya. However, their operational efficiency can vary significantly across different regions and over time. A Difference-in-Differences (DiD) approach was employed, utilising pre- and post-intervention data from randomly selected regions within Kenya. The DiD method compares changes in outcomes between treatment and control groups over time. Uncertainty in these estimates is quantified using robust standard errors. The analysis revealed a significant improvement in the efficiency of PDES after the implementation of new equipment, with an estimated increase in efficiency gains of approximately 15% across the sampled regions. This study provides empirical evidence that upgrading to modern power distribution equipment can lead to substantial improvements in operational efficiency in Kenya's electricity sector. The findings suggest that further investment and adoption of advanced PDES technology could enhance overall system performance and reliability, thereby improving service delivery to consumers. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Power-Distribution Systems, Difference-In-Differences, Econometrics, Efficiency Measurement, African Utilities, Methodological Evaluation*

ABSTRACT-ONLY PUBLICATION

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

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