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Methodological Evaluation of Power-Distribution Equipment Systems in Ethiopia Using Panel Data for Risk Reduction Analysis

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Abstract

The power distribution systems in Ethiopia are critical for economic development but face challenges such as frequent outages and inefficiencies. A fixed effects model was employed to analyse PDES in Ethiopia, accounting for time-invariant characteristics with random effects. Uncertainty quantification was achieved through robust standard errors. The analysis revealed a significant proportion ($p<0.05$) of equipment failures affecting power supply stability, highlighting the need for improved maintenance and redundancy strategies. This study provides insights into risk reduction in Ethiopian PDES, emphasising the importance of systematic monitoring and preventive measures. Implementing regular equipment inspections and enhancing backup systems can mitigate risks associated with PDES. Power Distribution Equipment Systems, Ethiopia, Panel Data Analysis, Risk Reduction The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Power Distribution Systems, Panel Data Analysis, Fixed Effects Model, Econometrics, Risk Measurement, Infrastructure Development*

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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