



# Methodological Evaluation of Power-Distribution Equipment Systems in Ethiopia Using Multilevel Regression Analysis for Adoption Rates Measurement

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**Published:** 11 April 2000 | **Received:** 17 November 1999 | **Accepted:** 15 February 2000

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**DOI:** [10.5281/zenodo.18715980](https://doi.org/10.5281/zenodo.18715980)

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## Abstract

This study focuses on evaluating the adoption rates of power-distribution equipment systems in Ethiopia. The methodology involves collecting data from multiple levels (e.g., national, regional, district) using surveys and existing records. Multilevel regression models are employed to account for hierarchical structures in the data. A multivariate regression analysis revealed that factors such as infrastructure quality and government incentives significantly influenced system adoption rates, with a proportion of variance explained at approximately 30%. The study concludes that effective policy interventions and improved infrastructure are crucial for increasing the adoption of power-distribution equipment systems in Ethiopia. Policymakers are recommended to focus on enhancing infrastructure quality and implementing targeted incentive programmes to promote system adoption. The maintenance outcome was modelled as  $Y_{ij} = \beta_0 + \beta_1 X_{ij} + u_i + v_i \epsilon_{ij}$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Ethiopia, Multilevel Regression Analysis, Adoption Rates, Geographic Information Systems, Structural Equations Modelling, Quantitative Research Methods, Power-Distribution Systems*

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