



# Methodological Evaluation of Power-Distribution Equipment Systems in Ethiopia Using Difference-in-Differences Approach to Assess System Reliability

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**Published:** 25 November 2008 | **Received:** 19 June 2008 | **Accepted:** 27 September 2008

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**DOI:** [10.5281/zenodo.18871318](https://doi.org/10.5281/zenodo.18871318)

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## Abstract

Power-distribution equipment systems are critical for reliable electricity supply in Ethiopia's agricultural sector. However, their performance and reliability vary significantly across regions. The DiD model was applied to analyse the impact of power distribution equipment upgrades on agricultural productivity, focusing on four regions. Uncertainty around estimates is quantified with robust standard errors. Power distribution systems showed a significant increase in efficiency and reliability after upgrades, particularly in the highland regions where the effect size was estimated at 25%. The DiD model demonstrates the effectiveness of infrastructure improvements in enhancing power-distribution equipment reliability. Future studies should explore scalability and cost-effectiveness. Investments in power distribution systems should prioritise areas with higher efficacy gains to maximise agricultural productivity. Power Distribution, Difference-in-Differences, Reliability, Ethiopia, Agricultural Sector 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:** Ethiopia, Power-Distribution Systems, Difference-In-Differences, Reliability Analysis, Geographic Information Systems, Econometrics, Supply Chain Management



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