



# Methodological Evaluation of Power-Distribution Equipment Systems in Rwanda Using Multilevel Regression Analysis

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## Abstract

Rwanda's power distribution infrastructure is critical for economic growth but faces challenges in reliability and efficiency. A multilevel logistic regression model was applied to assess the impact of PDES on yield outcomes across different geographical regions and time periods. The multilevel model revealed a significant effect (OR = 1.5,  $p < 0.05$ ) of PDES on improving yield in specific geographic regions with high power demand. Multilevel regression analysis provided insights into the effectiveness of PDES in Rwanda's context, highlighting areas needing further investment and policy support. Investment should be prioritised in regions where multilevel regression indicated a strong positive impact on yield from improved PDES performance.

**Keywords:** *Rwanda, Power Distribution, Multilevel Regression, Logistic Model, Infrastructure Analysis, Methodology, Economic Impact*

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