African Food Processing Technology (Food Science/Technology)

# Enhancing Infrastructure Efficiency in Ethiopia: Replication Study of Municipal Assets Systems Using Multilevel Regression Analysis

**Fikru Tessema**[1,2], **Mamo Wondimu**[1]

[1] Bahir Dar University

[2] Department of Electrical Engineering, Gondar University

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**Correspondence:** ftessema@outlook.com

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**Author notes**

*Fikru Tessema is affiliated with Bahir Dar University and focuses on Engineering research in Africa.*

*Mamo Wondimu is affiliated with Bahir Dar University and focuses on Engineering research in Africa.*

## Abstract

This replication study aims to evaluate municipal infrastructure assets systems in Ethiopia by applying multilevel regression analysis. A multilevel regression analysis will be employed to measure efficiency gains across municipal infrastructure assets in Ethiopia. This approach considers both individual units (local governments) and higher-level factors such as regional economic conditions. The analysis revealed significant variability in asset performance, with some regions showing a 10% increase in efficiency after implementing recommended improvements. This replication study confirms the effectiveness of multilevel regression analysis for evaluating municipal infrastructure systems and highlights specific areas where improvements can be made. Based on the findings, targeted interventions should focus on upgrading maintenance protocols and increasing public awareness campaigns to enhance asset longevity and usage efficiency. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Ethiopia, Multilevel Regression Analysis, Spatial Statistics, Quantitative Methods, Geographic Information Systems, Asset Management, Spatial Econometrics*

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