



Methodological Evaluation of Transport Maintenance Depot Systems in Kenya Using Quasi-Experimental Design

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Abstract

Transport maintenance depots (TMDs) play a crucial role in ensuring efficient logistics operations for agricultural supply chains in Kenya. Despite their importance, there is limited empirical research on how to evaluate and improve TMD systems. The study employs a mixed-method approach combining quantitative survey data with qualitative interviews to evaluate TMD systems. A quasi-experimental design is used to compare the operational efficiency of depots under different conditions, employing statistical models such as regression discontinuity designs (RDD) with robust standard errors. A key finding from the analysis indicates that depot proximity to farms significantly affects service responsiveness and reliability, with a proportion of 75% improvement in response times when depots are within a 10 km radius. Additionally, the use of digital maintenance tracking systems increased system uptime by an average of 20 percentage points. The quasi-experimental design successfully identified actionable insights for enhancing TMD performance and reliability, providing evidence-based recommendations for policymakers and practitioners in agricultural logistics. Based on the findings, it is recommended that future research should focus on scaling up successful interventions and exploring innovative technologies to further improve depot operations and service delivery. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, reliability analysis, maintenance engineering, supply chain management, transportation systems, quasi-experimental design, system performance assessment*

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