African Environmental Engineering (Technology focus)

Methodological Evaluation of Transport Maintenance Depots in Ghana: Quasi-Experimental Design for Risk Reduction Assessment

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Abstract

Transport maintenance depots in Ghana are crucial for ensuring road safety and efficient logistics operations. However, their operational efficacy varies significantly across different regions. A mixed-method approach combining quantitative data analysis with qualitative insights from interviews and field observations was employed. The quasi-experimental design included pre- and post-intervention assessments to measure changes in road safety metrics. Significant reductions (30%) in traffic accidents were observed at depots equipped with advanced maintenance technologies compared to those without such upgrades, indicating a clear positive impact on risk reduction. The study underscores the importance of technological advancements for enhancing the efficacy of transport maintenance depots in Ghana. Future research should explore scalability and cost-effectiveness of these interventions. Transport authorities are encouraged to invest in upgrading existing depots with modern technologies, particularly those located in high-risk areas. Continuous monitoring and evaluation of deployment outcomes is also recommended. transport maintenance depots, risk reduction, quasi-experimental design, Ghana The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographical Information Systems, GIS, Maintenance Engineering, Risk Management, Quasi-Experimental Design, Sampling Theory, Transportation Planning*

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