African Mining Engineering

Methodological Evaluation of Transport Maintenance Depot Systems in Ethiopia Using Quasi-Experimental Design to Assess System Reliability

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Abstract

Transport maintenance depots (TMDs) play a crucial role in ensuring the reliability of transport infrastructure and services in Ethiopia's mining sector. A quasi-experimental design was employed to assess the impact of various operational and maintenance practices on system reliability. Data were collected through structured interviews and observational studies conducted at four representative depots across Ethiopia's mining regions. The analysis revealed that depot efficiency improved by approximately 20% when optimised maintenance protocols were implemented, with a median increase in service delivery time from 15 to 12 hours per vehicle. This study underscores the importance of standardised maintenance procedures and regular performance evaluations for enhancing TMD reliability and overall mining sector productivity in Ethiopia. Implementing continuous improvement programmes based on findings, along with training initiatives for depot staff, are recommended to further optimise system performance. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Mining Sector, Maintenance Depots, Reliability Analysis, Quasi-Experimental Design, Transport Infrastructure, System Evaluation*

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