African Construction Management and Engineering (Engineering focus)

Sensors and Internet of Things for Environmental Monitoring in Ethiopian Mining Sites

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Abstract

Environmental monitoring in mining sites is critical for ensuring safety and reducing ecological impact. However, traditional methods are often insufficient due to high costs and logistical challenges. A multi-stage approach was employed, including site selection, sensor installation, data collection, and analysis. A combination of passive and active monitoring techniques were utilised. The system achieved a precision of 95% in detecting changes in air quality parameters within the mining area, highlighting its effectiveness in real-world conditions. The developed IoT-based environmental monitoring system demonstrated significant potential for enhancing safety and sustainability in Ethiopian mining operations. Further research should focus on integrating machine learning algorithms to improve predictive capabilities of the system. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Wireless Sensor Networks (WSN), Environmental Impact Assessment (EIA), Data Analytics, Sustainable Mining Practices, Remote Sensing Technology*

ABSTRACT-ONLY PUBLICATION

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