African Coastal Engineering

Sustainable Technologies for Industrial Pollution Control in Zambian Industries: A Methodological Approach

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Abstract

Industrial pollution is a significant environmental challenge in Zambian industries, affecting both local ecosystems and human health. A mixed-methods research design combining quantitative data analysis with qualitative case studies was employed. The statistical model used was the Generalized Linear Model (GLM) to predict pollutant levels, with robust standard errors accounting for potential measurement uncertainties. The GLM revealed a significant negative relationship between investment in pollution control technologies and pollutant emissions, indicating that increased technological investments reduce industrial pollution by an average of 15%. This study provides evidence supporting the efficacy of sustainable technology investments in reducing industrial pollution. Policy makers are recommended to prioritise funding for advanced pollution control measures to enhance environmental sustainability and public health outcomes. Industrial Pollution, Sustainable Technologies, Zambian Industries, Environmental Engineering The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sustainable Technologies, Industrial Pollution Control, Environmental Engineering, Geographic Information Systems, Sustainability Metrics, Case Study, Quantitative Analysis*

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