



Comparative Assessment of Environmental Engineering Solutions for Industrial Pollution Control in Zambia

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Abstract

Industrial pollution in Zambia has become a significant environmental issue affecting both urban and rural areas. Current solutions include various engineering interventions aimed at reducing emissions and waste disposal. The study employed a mixed-methods approach involving literature review, expert interviews, and case studies. Comparative metrics were used to assess the effectiveness of each solution. A key finding is that while biofilters effectively reduce sulfur dioxide emissions by approximately 70%, their maintenance costs are high and require specialized technical expertise. The comparative analysis indicates that a hybrid approach combining advanced filtration systems with sustainable waste management practices yields the most promising results in terms of cost-effectiveness and environmental impact. Policy makers should consider integrating these findings into industrial pollution control strategies, particularly focusing on funding mechanisms to support the adoption of biofilters and other innovative solutions. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Zambian, Geographic, Landscape, Ecotechnics, Sustainable, Pollution, Control*

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