



Quasi-Experimental Design for Evaluating Cost-Effectiveness of Water Treatment Facilities in South Africa: An Analysis

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Abstract

Water treatment facilities in South Africa face challenges related to cost-effectiveness, leading to inconsistent service quality across different regions. A quasi-experimental design was employed to analyse data from existing water treatment systems in South Africa, focusing on factors affecting their efficiency and costs. The analysis revealed that the proportion of treated water meeting quality standards varied significantly across different facilities (e.g., 85% vs. 60%), suggesting a need for targeted interventions to improve performance. This quasi-experimental design provides insights into the cost-effectiveness metrics of water treatment systems in South Africa, highlighting areas where policy adjustments could enhance service delivery. Policy recommendations include targeting facilities with lower efficiency rates and implementing standardised monitoring protocols to ensure consistent quality and cost management. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, cost-effectiveness analysis, econometric methods, experimental design, policy evaluation, quasi-experimental design, water resources management*

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