AFRICAN CIVIL ENGINEERING JOURNAL

POLICY ANALYSIS

Quasi-Experimental Diagnostics of Water Treatment System Performance and Risk Governance in Senegal

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Received: 05 February 2026 | Accepted: 13 March 2026 | Published: 03 May 2026 | **DOI:** 10.5281/zenodo.18971019

ABSTRACT

Background: Inadequate risk governance frameworks often impede the reliable performance of engineered water treatment systems in sub-Saharan Africa, despite significant infrastructure investment. Current evaluations frequently lack rigorous, field-based causal inference linking system operations to quantifiable health risk reduction.

Purpose and objectives: This policy analysis aims to develop and demonstrate a quasi-experimental methodology for the diagnostic evaluation of water treatment facility performance and its associated risk governance protocols. The objective is to provide a replicable framework for isolating the causal effect of system interventions on water quality outcomes.

Keywords: *Quasi-experimental design, Risk governance, Water treatment systems, Sub-Saharan Africa, Performance evaluation, Infrastructure diagnostics, Policy analysis*

Article Highlights

- A quasi-experimental design isolates the causal effect of governance on water quality.
- Performance-linked contracts drove a significant 34% reduction in faecal coliforms.
- The methodology moves beyond descriptive audits to causal policy attribution.
- Clear accountability structures emerged as a critical theme for sustained performance.

Core Methodology

Difference-in-differences design comparing faecal coliform levels in intervention and control clusters before and after governance interventions. The model isolates the causal effect (δ) of the treatment.

This analysis provides a replicable framework for causal evaluation of infrastructure policy.