

A Quasi-Experimental Evaluation of Reliability in Tanzanian Water Treatment Systems

A Methodological Framework for Performance Diagnostics

Aisha Mwinyi¹ | Godfrey Mwakapenda^{1,2}
Neema Mwenda³

¹ Department of Civil Engineering, State University of Zanzibar (SUZA)

² Tanzania Commission for Science and Technology (COSTECH)

³ Catholic University of Health and Allied Sciences (CUHAS)

Correspondence: amwinyi@gmail.com

Received: 09 May 2000 | Accepted: 21 June 2000 | Published: 12 August 2000 | DOI: [10.5281/zenodo.18972701](https://doi.org/10.5281/zenodo.18972701)

ABSTRACT

Background: The reliability of water treatment infrastructure in sub-Saharan Africa is a critical determinant of public health and economic development. Current performance assessments often lack robust, diagnostic methodologies capable of isolating causal factors of system failure.

Purpose and objectives: This study aimed to develop and apply a novel quasi-experimental methodological framework for the performance diagnostics of water treatment systems, with the objective of quantifying reliability and identifying specific failure mechanisms.

Keywords: *Water treatment, Sub-Saharan Africa, Reliability engineering, Quasi-experimental design, Performance diagnostics, Infrastructure assessment, Tanzania*

Article Highlights

- Novel quasi-experimental framework applies causal inference to infrastructure diagnostics.
- Mechanical filtration identified as primary failure mode in Tanzanian water systems.
- Routine maintenance showed no statistically significant performance improvement.
- Methodology enables transferable, causal analysis beyond descriptive reporting.

Methodological Contribution

Applies econometric causal inference techniques to civil engineering performance evaluation, creating a rigorous diagnostic framework for infrastructure reliability.

This study provides a transferable methodological framework for causal performance diagnostics.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

REQUEST FULL PAPER

 **Email:** info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We
welcome your submissions!**

Join our community of African scholars and share
your groundbreaking work.

 **Submit at:** app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global
Knowledge