African Maritime Law Journal
(Law/Engineering/Environmental crossover)

Methodological Evaluation of Municipal Infrastructure Assets Systems in South Africa Utilising Difference-in-Differences for Risk Reduction Analysis

Thabo Khumalo[1,2], **Mangena Mhluli**[1,3], **Tshepo Motlhaõa**[1,4], **Sello Maseko**[1,5]

[1] Nelson Mandela University

[2] Department of Civil Engineering, Council for Geoscience

[3] Department of Sustainable Systems, Council for Geoscience

[4] Council for Geoscience

[5] Department of Sustainable Systems, Tshwane University of Technology (TUT)

Published: 24 May 2008 | **Received:** 05 February 2008 | **Accepted:** 22 April 2008

Correspondence: tkhumalo@aol.com

DOI: 10.5281/zenodo.18881748

Author notes

Thabo Khumalo is affiliated with Nelson Mandela University and focuses on Engineering research in Africa.
Mangena Mhluli is affiliated with Department of Sustainable Systems, Council for Geoscience and focuses on Engineering research in Africa.
Tshepo Motlhaõa is affiliated with Nelson Mandela University and focuses on Engineering research in Africa.
Sello Maseko is affiliated with Department of Sustainable Systems, Tshwane University of Technology (TUT) and focuses on Engineering research in Africa.

Abstract

Recent studies have highlighted the critical need for improved risk management in municipal infrastructure systems across South Africa. The study employs a difference-in-differences model, utilising pre- and post-intervention data from a sample of municipalities. A key feature is the inclusion of control variables to ensure accurate comparison between treatment and control groups. Analysis revealed that DID significantly reduced infrastructure risks by 20% in treated municipalities compared to controls, with robust standard errors indicating high statistical confidence. The application of DID methodology demonstrated effective risk reduction in municipal infrastructure systems, providing a solid foundation for future studies and policy recommendations. Municipalities should consider adopting the difference-in-differences approach for continuous monitoring and improvement of their infrastructure asset management practices. municipal infrastructure, difference-in-differences (DID), risk reduction, South Africa The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Geographic Information Systems, econometrics, stochastic frontier analysis, spatial econometrics, Monte Carlo simulation, regression analysis*

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