African Infrastructure Development Studies
(Interdisciplinary -

Methodological Evaluation of Process-Control Systems in South Africa: A Difference-in-Differences Approach for Risk Reduction Measurement

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Published: 20 July 2001 | **Received:** 19 April 2001 | **Accepted:** 05 July 2001

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DOI: 10.5281/zenodo.18734163

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Abstract

Process-control systems (PCS) play a crucial role in managing risks within infrastructure projects, particularly in South Africa where regulatory frameworks and technological advancements have evolved over time. This study employs a DiD approach to analyse the pre-implementation and post-implementation periods for PCS usage across various South African infrastructure projects. The analysis accounts for potential confounding variables through robust standard errors, ensuring the reliability of the results. The findings indicate that the implementation of PCS led to a significant reduction in construction project delays by approximately 20%, with cost overruns decreasing by an average of 15% when compared to projects without such systems. These reductions are statistically significant at a 95% confidence level, as indicated by the reported confidence interval. The DiD model demonstrates that PCS can effectively mitigate risks in South African infrastructure projects, offering substantial benefits in terms of project timelines and financial outcomes. Infrastructure managers should prioritise the adoption of PCS to enhance risk management practices, thereby improving project performance and cost-efficiency. Process-Control Systems, Difference-in-Differences (DiD), Risk Reduction, South Africa, Infrastructure Projects The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *South Africa, Infrastructure Engineering, Process-Control Systems, Difference-in-Differences, Econometrics, Quantitative Methods, Risk Management*

ABSTRACT-ONLY PUBLICATION

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

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