African Urban Design Journal (Technical/Design focus)

Multilevel Regression Analysis for Measuring Adoption Rates in Process-Control Systems in South Africa

Nokuthula Phikane[1], **Zola Motshega**[2]

[1] University of Zululand

[2] Department of Civil Engineering, University of Zululand

Published: 22 March 2000 | **Received:** 20 December 1999 | **Accepted:** 18 February 2000

Correspondence: nphikane@outlook.com

DOI: 10.5281/zenodo.18715124

Author notes

Nokuthula Phikane is affiliated with University of Zululand and focuses on Engineering research in Africa.
Zola Motshega is affiliated with Department of Civil Engineering, University of Zululand and focuses on Engineering research in Africa.

Abstract

Process-control systems (PCSs) are critical in managing complex industrial processes to ensure efficiency and safety. In South Africa, these systems are implemented across various sectors but their adoption rates vary significantly. We employed multilevel logistic regression models to assess the impact of factors such as industry type, geographical location, and organisational size on PCS adoption. Data from a survey conducted across multiple sectors was used for this analysis. Our findings indicate that industries in urban areas with larger organizations have higher adoption rates of PCSs (urban industrial sector: 70%, large organizations: 85%). The multilevel regression approach provides a nuanced understanding of the factors influencing PCS adoption, offering insights for policymakers and industry leaders. Policymakers should prioritise urban areas with larger organizations to maximise the benefits of process-control systems in South Africa's industrial sectors. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, multilevel modelling, hierarchical analysis, industrial organisation, process efficiency, econometrics, qualitative research methods*

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