

Methodological Evaluation of Process-Control Systems in South Africa

A Panel-Data Framework for Yield Optimisation

Kagiso Naidoo^{1,2}, Thandiwe Nkosi³, Pieter van der Merwe⁴

Department of Civil Engineering, North-West University | Department of Electrical Engineering, University of Cape Town | University of Cape Town | University of Zululand

Correspondence: knaidoo@aol.com

Received: 24 February 2006 | Accepted: 12 June 2006 | Published: 24 July 2006 | DOI:

[10.5281/zenodo.18972603](https://doi.org/10.5281/zenodo.18972603)

ABSTRACT

Background: Process-control systems are integral to manufacturing and resource-based industries, yet robust methodologies for quantifying their impact on production yield in operational settings are lacking. This gap hinders evidence-based investment and optimisation decisions within the engineering sector.

Purpose and objectives: This article presents a methodological framework for the empirical evaluation of process-control systems. Its objective is to provide a rigorous panel-data econometric approach to isolate and measure the causal effect of such systems on yield, controlling for confounding operational variables.

Keywords: *Panel-data estimation, Process-control systems, Yield optimisation, South Africa, Manufacturing industries, Fixed-effects models*

Article Highlights

- Proposes fixed-effects panel-data model to isolate causal impact of control systems
- Demonstrates methodological bias in conventional evaluation approaches
- Provides structured framework for evidence-based investment decisions
- Emphasizes need for granular, time-series operational data collection

Core Econometric Specification

$Y_{it} = \alpha_i + \beta T_{it} + \gamma X_{it} + \varepsilon_{it}$, where α_i represents unit-specific fixed effects, T_{it} indicates system implementation, and X_{it} controls for time-varying operational factors.

This methodological article presents an analytical framework rather than empirical results.

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