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Methodological Evaluation and Panel-Data Estimation of Process-Control System Adoption in South Africa, 2000–2026

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ABSTRACT

Background: The adoption of advanced process-control systems (PCS) is critical for enhancing productivity and safety in engineering sectors. In the South African context, a comprehensive, longitudinal analysis of adoption drivers and rates has been lacking, hindering evidence-based industrial policy and investment.

Purpose and objectives: This study aims to methodologically evaluate factors influencing PCS adoption and to estimate robust, longitudinal adoption rates within the nation's major engineering industries.

Keywords: *Process-control systems, Panel-data estimation, Technology adoption, South Africa, Industrial automation, Methodological evaluation, Manufacturing sector*

Article Highlights

- Firm-level technological capability is the primary driver of process-control system adoption.
- Regulatory pressure shows significant but secondary influence on adoption rates.
- Firm size is not a statistically significant driver after controlling for capability.
- Adoption barriers are fundamentally technical and skill-based, requiring targeted interventions.

Core Methodology

Fixed-effects panel-data model using firm-level survey data, with robust standard errors clustered at firm level.

This study provides the first longitudinal econometric analysis of PCS adoption in South Africa.

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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