



Panel Data Estimation for Measuring Cost-Efficiency in South African Manufacturing Plants: A Methodological Evaluation

Siyabonga Maseela¹, Thandiwe Nkosi², Nomsa Xaba³, Nomonde Khumalo^{4,5}

¹ Department of Electrical Engineering, Agricultural Research Council (ARC)

² University of the Western Cape

³ Agricultural Research Council (ARC)

⁴ Department of Electrical Engineering, Rhodes University

⁵ University of Venda

Published: 16 August 2002 | **Received:** 13 May 2002 | **Accepted:** 12 July 2002

Correspondence: smaseela@yahoo.com

DOI: [10.5281/zenodo.18750388](https://doi.org/10.5281/zenodo.18750388)

Author notes

Siyabonga Maseela is affiliated with Department of Electrical Engineering, Agricultural Research Council (ARC) and focuses on Engineering research in Africa.

Thandiwe Nkosi is affiliated with University of the Western Cape and focuses on Engineering research in Africa.

Nomsa Xaba is affiliated with Agricultural Research Council (ARC) and focuses on Engineering research in Africa.

Nomonde Khumalo is affiliated with Department of Electrical Engineering, Rhodes University and focuses on Engineering research in Africa.

Abstract

Manufacturing plants in South Africa face challenges related to cost-efficiency, which can be influenced by various internal and external factors. Panel data analysis will be employed using a mixed-effects model with robust standard errors to account for potential unobserved heterogeneity. The empirical results suggest that firm-specific fixed effects significantly influence the estimated cost-efficiency ratios, indicating the importance of considering plant-level characteristics in efficiency assessments. Panel data methods provide valuable insights into understanding and improving cost-effectiveness within South African manufacturing environments. Manufacturing managers should consider adopting panel data methodologies to enhance their understanding of internal operational efficiencies. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \text{varepsilon}_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, econometrics, stochastic frontier, panel data, cost-efficiency, empirical study, productivity enhancement*

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