



# Methodological Evaluation of Manufacturing Plants Systems in South Africa: A Difference-in-Differences Approach for Cost-Effectiveness Analysis

Ntokozo Khumalo<sup>1</sup>

<sup>1</sup> Stellenbosch University

**Published:** 15 November 2005 | **Received:** 26 June 2005 | **Accepted:** 03 October 2005

**Correspondence:** [nkhumalo@hotmail.com](mailto:nkhumalo@hotmail.com)

**DOI:** [10.5281/zenodo.18819227](https://doi.org/10.5281/zenodo.18819227)

## Author notes

*Ntokozo Khumalo is affiliated with Stellenbosch University and focuses on Energy research in Africa.*

## Abstract

This study addresses a current research gap in Energy concerning Methodological evaluation of manufacturing plants systems in South Africa: difference-in-differences model for measuring cost-effectiveness in South Africa. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of manufacturing plants systems in South Africa: difference-in-differences model for measuring cost-effectiveness, South Africa, Africa, Energy, theoretical This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows  $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, Manufacturing, Econometrics, Difference-in-Differences, Cost-Benefit Analysis, Energy Efficiency, Sustainability*

## 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](mailto: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](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge