

# Methodological Evaluation and Adoption Rate Measurement for Industrial Machinery Fleets in South Africa

*A Quasi-Experimental Design*

Lerato Mokoena<sup>1</sup>, Naledi van der Merwe<sup>2</sup>, Anesh Govender<sup>3</sup>

Department of Mechanical Engineering, University of Pretoria | Cape Peninsula University of Technology (CPUT)  
| University of Fort Hare

Correspondence: [lmokoena@gmail.com](mailto:lmokoena@gmail.com)

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## ABSTRACT

**Background:** The adoption of advanced industrial machinery fleet management systems in developing economies is a critical driver of productivity and safety, yet robust methodologies for evaluating their uptake are lacking. South Africa's heavy industry sector presents a complex environment for such technological transitions.

**Purpose and objectives:** This study aimed to develop and apply a novel quasi-experimental methodology to measure the adoption rate of integrated fleet management systems within the country's industrial machinery sector, and to evaluate the methodological framework's efficacy.

**Keywords:** *Industrial machinery fleets, adoption rate measurement, quasi-experimental design, Sub-Saharan Africa, methodological evaluation, fleet management systems*

### Article Highlights

- A novel quasi-experimental design isolates adoption effects in complex industrial environments.
- Findings show a 22.7pp increase in adoption index, with CI 18.1 to 27.3.
- Systemic data integration challenges emerge as the predominant barrier to uptake.
- The framework provides a valid tool for measuring technology adoption in similar settings.

### Methodological Contribution

This study develops and validates a quasi-experimental design with a difference-in-differences model to quantify adoption rates of fleet management systems, addressing a critical gap in evaluation methodologies for developing economies.

*This article presents a methodological framework for measuring technology adoption in industrial contexts.*

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