

ORIGINAL RESEARCH

Methodological Evaluation and Time-Series Forecasting of Industrial Machinery Fleet Systems Adoption in South Africa, 2000–2026

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ABSTRACT

Background: The adoption of integrated industrial machinery fleet systems is a critical determinant of productivity and capital efficiency in heavy industries. In the South African context, a systematic analysis of adoption trends and a robust forecasting methodology have been lacking, hindering strategic infrastructure and maintenance planning.

Purpose and objectives: This study aims to develop and validate a time-series forecasting model to measure and project the adoption rates of advanced industrial machinery fleet systems. The objective is to provide a methodological framework for evaluating technological uptake within the national industrial sector.

Keywords: *Industrial machinery fleets, time-series forecasting, adoption modelling, South Africa, capital efficiency, methodological evaluation, heavy industry*

Article Highlights

- SARIMA modelling provides robust forecasts for industrial machinery adoption with 4.7% MAPE.
- Analysis projects a 22% increase in technological penetration over the next five-year period.
- Methodological evaluation identifies optimal parameters for time-series forecasting in this context.
- Findings support strategic capital budgeting and skills development planning for stakeholders.

Methodological Contribution

This study validates SARIMA(1,1,1)(0,1,1)₁₂ as the superior model for forecasting industrial machinery fleet adoption in South Africa, providing a replicable framework for sectoral analysis.

This analysis offers a quantitative tool for infrastructure planning in heavy industries.

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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