

# A Time-Series Forecasting Model for Efficiency Gains in South African Municipal Infrastructure Asset Management (2000–2026)

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## ABSTRACT

**Background:** Municipal infrastructure asset management in South Africa faces systemic challenges, including ageing assets, fiscal constraints, and inconsistent performance measurement. Existing frameworks often lack robust, forward-looking quantitative tools to evaluate the efficiency of asset management systems and inform capital investment policy.

**Purpose and objectives:** This policy analysis develops and evaluates a novel time-series forecasting model to quantify efficiency gains within municipal infrastructure asset management systems. The objective is to provide a replicable methodological tool for benchmarking performance and informing strategic infrastructure investment policy.

**Keywords:** *Municipal infrastructure, Asset management, Time-series forecasting, Efficiency gains, Sub-Saharan Africa, Policy analysis, Engineering systems*

### Article Highlights

- VAR model forecasts 1.2% annual efficiency gain under current policy
- Maintenance spending shows longer-term benefits than capital replacement
- Model provides robust instrument for infrastructure policy simulation
- Recommends ring-fenced funding for preventative maintenance programmes

### Policy Implication

Targeted operational expenditure on maintenance yields significant long-term efficiency dividends for municipal infrastructure portfolios.

*This analysis provides a quantitative framework for evidence-based infrastructure investment policy.*

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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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