



# Methodological Evaluation of Process-Control Systems in South Africa: Time-Series Forecasting for Efficiency Measurement

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## Abstract

South Africa's construction industry is characterized by a mix of traditional and modern project management practices. A quantitative analysis approach was employed, incorporating time-series forecasting models such as ARIMA (AutoRegressive Integrated Moving Average) to forecast project durations and costs. The time-series forecasting model demonstrated an accuracy rate of 85% in predicting project completion times, with a confidence interval of  $\pm 10\%$ . This indicates the model's reliability for measuring efficiency gains. This study validates the effectiveness of ARIMA models for enhancing efficiency measurement in South African construction projects. The findings suggest that adopting and refining time-series forecasting methods could lead to significant improvements in project management practices, thereby increasing overall efficiency and productivity. 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, forecasting, autoregression, stochastic processes, regression analysis, innovation diffusion*

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