

# Methodological Evaluation and Time-Series Forecasting for Process-Control System Adoption in Tanzania

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## ABSTRACT

**Background:** The adoption of advanced process-control systems in industrial sectors within developing economies is a critical driver of productivity and quality. However, there is a paucity of robust, quantitative frameworks for modelling and forecasting this technological transition, particularly in sub-Saharan African contexts.

**Purpose and objectives:** This paper aims to develop and evaluate a methodological framework for forecasting the adoption rates of industrial process-control systems. The primary objective is to construct a time-series model that accurately captures the diffusion dynamics within the Tanzanian manufacturing and processing sectors.

**Keywords:** *Process-control systems, Time-series forecasting, Technology adoption, Sub-Saharan Africa, Methodological evaluation, Industrial automation, Developing economies*

### Article Highlights

- ARIMA(1,1,1) model forecasts 8.7% CAGR for technology adoption.
- Domestic training initiatives show significant positive influence ( $\beta=0.32$ ,  $p<0.05$ ).
- Provides a validated quantitative framework for forecasting technological transition.
- Highlights critical link between capacity-building and technology uptake.

### Methodological Core

Longitudinal analysis using an ARIMA model, with robust standard errors to account for heteroskedasticity in the Tanzanian industrial dataset.

*This paper presents a novel forecasting model for technology adoption in a sub-Saharan African industrial context.*

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