African Land Degradation Studies (Environmental/Earth Science)

Time-Series Forecasting Model Evaluation for Cost-Effectiveness in South African Manufacturing Plants Systems,

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Abstract

This study focuses on evaluating manufacturing plants systems in South Africa to assess cost-effectiveness over a specific period. A time-series analysis was conducted using an ARIMA (AutoRegressive Integrated Moving Average) model. The dataset comprised quarterly financial reports of manufacturing plants from -, focusing on energy consumption, labour costs, and production output. The ARIMA(1,1,1) model demonstrated a strong fit with an R^2 value of 0.85 and a standard error of the estimate (SEE) of ± 345 *per quarter , indicating significant predictive power* $\in$ *cost* $-$ *effectiveness measurement . The time* $-$ *series fo* $Y = \beta_{0+\beta}^{\rightarrow} p\, X +$ *varepsilon \$,* $\wedge$ *inference is reported with uncertainty* $-$ *aware statistical criteria .*

Keywords: *Sub-Saharan, econometrics, ARIMA, stochastic processes, grey systems theory, predictive modelling, regression analysis*

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