



Methodological Assessment of Process-Control Systems in Nigerian Industries: An Efficiency Gain Analysis Using Panel Data Techniques

Saleh Musa^{1,2}, Usman Lawal²

¹ Department of Electrical Engineering, Nnamdi Azikiwe University, Awka

² Nigerian Institute of Social and Economic Research (NISER)

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Correspondence: smusa@gmail.com

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Author notes

Saleh Musa is affiliated with Department of Electrical Engineering, Nnamdi Azikiwe University, Awka and focuses on Engineering research in Africa.

Usman Lawal is affiliated with Nigerian Institute of Social and Economic Research (NISER) and focuses on Engineering research in Africa.

Abstract

Process-control systems (PCS) are critical for enhancing efficiency in industrial settings, yet their application and impact vary across different sectors. Panel data techniques were employed to analyse the performance metrics of PCS implementations in various industrial settings within Nigeria. The empirical analysis utilised econometric methods including fixed effects models for robust inference. The findings indicate that process-control systems have contributed an average of 12% to productivity gains, with significant variability across different industries. This study provides evidence on the impact of PCS in Nigeria's industrial context, offering insights into potential improvements and best practices for future applications. Further research should explore the specific types of PCS that yield the highest efficiency gains and identify sectors where such systems could be particularly beneficial. Process-Control Systems, Efficiency Gains, Panel Data Techniques, Nigerian Industries The maintenance outcome was modelled as $Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + v_t + \epsilon_{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Nigerian industries, Process-control systems, Panel data, Econometrics, Efficiency measurement, Time-series analysis, Cross-section analysis*

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