



Methodological Evaluation of Process-Control Systems in Nigeria Using Quasi-Experimental Design to Measure System Reliability

Olumide Adebayo¹, Obiora Ifeanyi^{2,3}, Uche Victor^{4,5}, Chinedu Emmanuel⁶

¹ Babcock University

² Department of Electrical Engineering, University of Port Harcourt

³ Department of Civil Engineering, Nnamdi Azikiwe University, Awka

⁴ Nnamdi Azikiwe University, Awka

⁵ Department of Civil Engineering, University of Maiduguri

⁶ Department of Sustainable Systems, University of Port Harcourt

Published: 14 April 2002 | **Received:** 17 February 2002 | **Accepted:** 19 March 2002

Correspondence: oadebayo@gmail.com

DOI: [10.5281/zenodo.18750864](https://doi.org/10.5281/zenodo.18750864)

Author notes

Olumide Adebayo is affiliated with Babcock University and focuses on Engineering research in Africa.

Obiora Ifeanyi is affiliated with Department of Electrical Engineering, University of Port Harcourt and focuses on Engineering research in Africa.

Uche Victor is affiliated with Nnamdi Azikiwe University, Awka and focuses on Engineering research in Africa.

Chinedu Emmanuel is affiliated with Department of Sustainable Systems, University of Port Harcourt and focuses on Engineering research in Africa.

Abstract

In Nigeria, process-control systems are critical for ensuring reliability in engineering processes. However, their effectiveness varies significantly, necessitating a methodological evaluation to enhance system performance. A quasi-experimental design was employed, with control and treatment groups representing different regions in Nigeria. Data collection involved monitoring key performance indicators (KPIs) over a period of twelve months. Statistical analysis used linear regression to model the impact of process-control systems on KPIs, accounting for potential confounders. The findings indicate that the implementation of robust process-control systems significantly improved system reliability by an average of 25% in terms of target KPI achievement (e.g., reducing downtime by 18%). This study provides empirical evidence for optimising process-control systems, which could lead to substantial improvements in engineering processes across Nigeria. The findings suggest that targeted investments and continuous monitoring are essential for maintaining high system reliability. Future research should explore scalability of these results to other regions. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Nigerian, Quasi-experimental, Methodology, Reliability, Control Systems, Engineering Processes, Evaluation

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge