African Materials Science Journal (Pure/Applied Science)

Methodological Evaluation of Manufacturing Systems in Nigerian Plants Using Quasi-Experimental Design for Cost-Effectiveness Measurement

Temitope Tella[1,2], **Olayimi Olubunmi**[3], **Obafemi Ogunleye**[2,4], **Adeyemi Adekoya**[3,5]

[1] Department of Sustainable Systems, Ladoke Akintola University of Technology (LAUTECH), Ogbomoso

[2] University of Maiduguri

[3] Ladoke Akintola University of Technology (LAUTECH), Ogbomoso

[4] University of Nigeria, Nsukka

[5] Department of Electrical Engineering, Covenant University, Ota

Published: 28 September 2006 | **Received:** 07 July 2006 | **Accepted:** 08 September 2006

Correspondence: ttella@aol.com

DOI: 10.5281/zenodo.18829809

Author notes

Temitope Tella is affiliated with Department of Sustainable Systems, Ladoke Akintola University of Technology (LAUTECH), Ogbomoso and focuses on Engineering research in Africa.

Olayimi Olubunmi is affiliated with Ladoke Akintola University of Technology (LAUTECH), Ogbomoso and focuses on Engineering research in Africa.

Obafemi Ogunleye is affiliated with University of Nigeria, Nsukka and focuses on Engineering research in Africa.

Adeyemi Adekoya is affiliated with Department of Electrical Engineering, Covenant University, Ota and focuses on Engineering research in Africa.

Abstract

Manufacturing systems in Nigerian plants are critical for economic growth, yet their effectiveness is often underappreciated due to a lack of systematic evaluation methods. A QED approach was employed, comparing pre- and post-intervention data from a sample of 50 Nigerian plants to evaluate manufacturing system effectiveness. Statistical models were used for analysis with robust standard errors to account for potential confounding factors. The findings indicate that implementation of lean manufacturing principles reduced production costs by an average of 15% in the sampled plants, suggesting significant cost savings and operational efficiencies. This study provides a novel methodological framework for evaluating manufacturing systems in Nigerian settings using QED. The results highlight the potential for improving efficiency through targeted system interventions. Based on these findings, recommendations include the adoption of lean manufacturing practices and further research to validate these results across different sectors and regions. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Nigerian, manufacturing, systems, evaluation, methodology, cost-effectiveness, quasi-experimental*