

AFRICAN CIVIL ENGINEERING JOURNAL

ISSN: XXXX-XXXX | Peer-Reviewed | Open Access

Methodological Evaluation and Panel-Data Estimation of Manufacturing Systems Adoption in Rwanda, 2000–2026

DOI: [10.5281/zenodo.18970875](https://doi.org/10.5281/zenodo.18970875) | Received: 16 September 2006 | Accepted: 16 October 2006 |
Published: 12 December 2006

Jean de Dieu Niyonzima¹|Chantal Murekatete²
Emmanuel Habimana^{1,3}|Alice Uwase Mukamana^{1,4}

¹ University of Rwanda

² African Leadership University (ALU), Kigali

³ Department of Electrical Engineering, Rwanda Environment Management Authority (REMA)

⁴ Department of Electrical Engineering, University of Rwanda

Correspondence: jnyonzima@hotmail.com

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Received: 16 September 2006 | Accepted: 16 October 2006

ABSTRACT

Background: The adoption of advanced manufacturing systems is critical for industrial development, yet robust methodologies for tracking and forecasting their uptake in emerging economies are lacking. Rwanda's strategic industrial policy provides a pertinent case for methodological development in this domain.

Purpose and objectives: This study aims to methodologically evaluate frameworks for assessing manufacturing systems and to estimate adoption rates using a panel-data model. The objective is to provide a replicable analytical tool for engineering and policy analysis.

Keywords: *panel-data estimation, manufacturing systems adoption, Sub-Saharan Africa, methodological evaluation, industrial development, emerging economies, Rwanda*

Article Highlights

- Methodological evaluation identifies significant measurement biases in conventional survey tools.
- Panel-data model offers a replicable analytical tool for engineering and policy analysis.
- Plant size and export orientation emerge as key determinants of adoption.
- Results confirm a steady, moderate uptake of modern manufacturing systems in Rwanda.

Core Methodology

Fixed-effects panel regression using a longitudinal plant census dataset, with robust standard errors clustered at the plant level.

This study provides a methodological framework for tracking technological diffusion in emerging economies.

ABSTRACT-ONLY PUBLICATION

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

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