

A Panel-Data Analysis of Advanced Manufacturing Systems Adoption in Kenyan Industrial Plants, 2000–2026

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ABSTRACT

Background: The adoption of advanced manufacturing systems (AMS) is critical for industrial competitiveness, yet longitudinal evidence on the pace and determinants of adoption in developing economies remains sparse. Kenya's manufacturing sector, a key component of national development strategies, presents a significant case for analysis.

Purpose and objectives: This study aims to quantify the rate of AMS adoption within Kenyan industrial plants and to identify the key operational and financial factors that influence this technological transition. The primary objective is to provide a robust, longitudinal assessment using panel-data econometrics.

Keywords: *Advanced manufacturing systems, Panel-data analysis, Industrial adoption, Kenyan manufacturing, Sub-Saharan Africa, Technology diffusion, Longitudinal study*

Article Highlights

- A one-standard-deviation increase in lagged ROI raised adoption probability by 7.2 percentage points.
- Plant size showed statistically insignificant effects when controlling for unobserved heterogeneity.
- Internal capital generation is identified as a critical enabler for advanced manufacturing adoption.
- Findings challenge assumptions that scale alone drives technology diffusion in emerging economies.

Core Econometric Model

Linear probability model with plant fixed effects: $\text{Adoption}_{it} = \alpha_i + \beta_1 \text{Size}_{it} + \beta_2 \text{ROI}_{it-1} + \gamma_t + \varepsilon_{it}$. Inference uses robust standard errors clustered at plant level.

This analysis provides panel-data evidence from 2000–2026 on the determinants of technological transition.

ABSTRACT-ONLY PUBLICATION

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