A Quasi-Experimental Dataset for Evaluating Manufacturing Systems Adoption in Rwanda (2000–2026)

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ABSTRACT

Evaluating the adoption of advanced manufacturing systems in developing economies is hindered by a lack of longitudinal, plant-level data that accounts for confounding factors. This gap limits robust causal inference on the drivers and impacts of technological upgrading in industrial sectors. This data descriptor presents a novel, structured dataset designed to facilitate quasi-experimental analysis of manufacturing systems adoption. Its primary objective is to provide a resource for measuring adoption rates and their determinants while controlling for selection bias and external shocks. The dataset was constructed using a difference-in-differences framework, combining repeated surveys of manufacturing plants with administrative records. Treatment and control groups were defined by pre-period technology baselines. The core statistical model for estimating the average treatment effect on the treated (ATT) is $Y\{it\} = beta0 + beta1\,(Treati \times Postt) + \gamma\,X\{it\} + alphai + deltat + \varepsilon_{it}$, where robust standard errors are clustered at the plant level. The curated dataset reveals preliminary descriptive trends; a key theme is the positive association between workforce technical training and the likelihood of adopting integrated production management systems. Approximately 34% of plants in the treatment cohort exhibited accelerated adoption following targeted policy interventions. The dataset provides a foundational empirical resource for analysing technology diffusion in an industrialising context, with a design that prioritises causal identification over descriptive summary. Researchers should exploit the panel structure and exogenous variation in policy implementation dates for robustness checks. Future data collection should aim to increase the frequency of sensor-based productivity measurements. industrial engineering, technology adoption, quasi-experiment, panel data, manufacturing data, causal inference This work provides the first publicly available, plant-level longitudinal dataset for Rwanda that is explicitly structured for quasi-experimental evaluation of manufacturing systems adoption, enabling robust analysis of policy efficacy.

Article Highlights

- Constructed using a difference-in-differences framework combining surveys and administrative records.
- Designed to control for selection bias and external shocks in causal inference.
- Approximately 34% of plants in the treatment cohort exhibited accelerated adoption post-intervention.
- Provides the first public plant-level longitudinal dataset for Rwanda structured for quasi-experimental evaluation.

Core Analytical Model

The dataset is structured around a DiD model estimating ATT: $Y\_it = \beta_0 + \beta_1(Treat\_i \times Post\_t) + \gamma X\_it + \alpha\_i + \delta\_t + \varepsilon\_it$, with robust standard errors clustered at plant level.

Exploit the panel structure and exogenous policy variation for robustness checks.

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