



Methodological Evaluation of Manufacturing Plant Systems in Senegal Using Quasi-Experimental Design for Adoption Measurement

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Abstract

The adoption of advanced manufacturing plant systems in Senegal has been observed to vary significantly across different sectors and regions. Current studies often rely on qualitative approaches or cross-sectional data, which may not capture the nuances of system uptake effectively. A mixed-method approach combining quantitative surveys with qualitative interviews was employed. Data were collected from a sample of 120 manufacturing plants across Senegal, representing various sectors and geographical locations. Quasi-experimental designs such as difference-in-differences (DID) and interrupted time series analysis (ITS) were used to assess the impact of system adoption. The findings indicate that the proportion of plants adopting advanced systems varied significantly between sectors, with manufacturing in urban areas showing higher rates than rural regions. The use of DID revealed a statistically significant increase in productivity by 15% among plants that adopted new technologies compared to those who did not. The quasi-experimental designs proved effective in measuring adoption rates and the impact on productivity. These findings contribute to a better understanding of how different socio-economic factors influence technology adoption in manufacturing environments. Further research should explore the long-term effects of system adoption and consider the role of government incentives in promoting technological upgrades among small-scale manufacturers in Senegal. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Sub-Saharan, econometrics, productivity, intervention, randomized, qualitative, diffusion

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