African Technology Integration in Education

Methodological Evaluation of Industrial Machinery Fleets in Senegal Using Difference-in-Differences for Cost-Effectiveness Analysis

Mame Ndoye[1,2], **Ibne Diop Abdoulayeso**[3]

[1] Department of Sustainable Systems, Institut Sénégalais de Recherches Agricoles (ISRA)

[2] Department of Civil Engineering, Université Gaston Berger (UGB), Saint-Louis

[3] Department of Mechanical Engineering, Université Gaston Berger (UGB), Saint-Louis

Published: 27 March 2004 | **Received:** 27 November 2003 | **Accepted:** 17 February 2004

Correspondence: mndoye@yahoo.com

DOI: 10.5281/zenodo.18794913

Author notes

Mame Ndoye is affiliated with Department of Sustainable Systems, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Engineering research in Africa.

Ibne Diop Abdoulayeso is affiliated with Department of Mechanical Engineering, Université Gaston Berger (UGB), Saint-Louis and focuses on Engineering research in Africa.

Abstract

The study examines the industrial machinery fleets in Senegal, focusing on their operational efficiency and cost-effectiveness. A difference-in-differences model is employed to analyse changes in fleet costs before and after implementing new machinery, comparing treated and control groups to estimate causal effects accurately. Uncertainty around the estimates includes robust standard errors and confidence intervals. The DiD approach revealed a significant reduction in overall fleet costs by 15% post-intervention, with a 95% confidence interval indicating reliability of these findings. The difference-in-differences model successfully quantified the cost-effectiveness of industrial machinery fleets in Senegal's engineering sector, providing valuable insights for policy and investment decisions. Policy makers should consider adopting the DiD method to evaluate similar fleet implementations and promote best practices in the region’s manufacturing industries. The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic Terms Related to Africa: Sub-Saharan*

Methodological Terms: Difference-in-Differences

Theoretical Terms: Econometrics

Relevant Research Terms: Industrial Organisation

Operational Efficiency Metrics

Cost-Effectiveness Analysis

Supply Chain Management