



# Methodological Evaluation of Manufacturing Systems Efficiency in Senegal Using Difference-in-Differences Approach

Mamy Diop<sup>1</sup>, Samba Guindo<sup>2</sup>

<sup>1</sup> Department of Artificial Intelligence, Institut Pasteur de Dakar

<sup>2</sup> Institut Pasteur de Dakar

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Correspondence: [mdiop@gmail.com](mailto:mdiop@gmail.com)

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### Author notes

Mamy Diop is affiliated with Department of Artificial Intelligence, Institut Pasteur de Dakar and focuses on Computer Science research in Africa.

Samba Guindo is affiliated with Institut Pasteur de Dakar and focuses on Computer Science research in Africa.

### Abstract

This study addresses a current research gap in Computer Science concerning Methodological evaluation of manufacturing plants systems in Senegal: difference-in-differences model for measuring efficiency gains in Senegal. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of manufacturing plants systems in Senegal: difference-in-differences model for measuring efficiency gains, Senegal, Africa, Computer Science, working paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used  $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \sqrt{\theta} \sqrt{\theta}^2$ , with performance evaluated using out-of-sample error.

**Keywords:** Sub-Saharan, African, Socioeconomic, Input-Output, Panel, Dynamics, Empirical

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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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