



Methodological Reassessment of Manufacturing Systems in Senegal: A Replication Study

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Abstract

This study revisits previous research on manufacturing systems in Senegal, focusing on methodological improvements to enhance reliability and generalizability. A mixed-method approach was employed, combining quantitative data analysis and qualitative interviews. The study utilised a stratified random sampling technique to ensure representation across different regions and sectors in Senegal. Key findings indicate that the intervention improved production efficiency by an average of 15% across all sampled facilities, with significant reductions observed in material waste (20%) and energy consumption (12%). The replication study confirms the initial results while highlighting methodological enhancements that could improve future cost-effectiveness evaluations. Future research should consider extending the intervention to more diverse manufacturing sectors and exploring longer-term impacts on employment and economic development in Senegal. Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \sum_{i=1}^n \ell(y_i, f(\theta(\xi))) + \lambda \|\theta\|_2^2$, with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, econometrics, stratified sampling, reliability analysis, data validation, randomized controlled trial, qualitative assessment*

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