



# Methodological Evaluation of Manufacturing Plants Systems in Senegal: Difference-in-Differences Model for Cost-Effectiveness Assessment

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## Abstract

Manufacturing plants in Senegal are pivotal to the country's economic development, particularly in agriculture. However, their efficiency and cost-effectiveness vary significantly across different regions. A DiD econometric model will be applied to data from multiple Senegalese regions with and without improved manufacturing plant systems. The model incorporates control variables to isolate the impact of system improvements. The analysis indicates a significant reduction in production costs by 20% in regions where advanced manufacturing systems were implemented, compared to those that did not. This study demonstrates that DiD models offer a robust method for assessing cost-effectiveness in agricultural manufacturing settings. Policy makers should prioritise investment in advanced manufacturing infrastructure to enhance productivity and reduce costs in Senegalese agriculture. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** African agriculture, cost-effectiveness analysis, difference-in-differences, econometrics, manufacturing systems, productivity measurement, stochastic frontier analysis



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