



Methodological Assessment of Manufacturing Systems in Senegal: A Panel Data Approach to Measuring Cost-Effectiveness

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Abstract

Manufacturing systems in Senegal are diverse and exhibit varying levels of efficiency, influenced by economic factors and technological advancements. The study employs a fixed effects model to analyse data from multiple manufacturing plants across different sectors of the economy over several years, accounting for potential cross-sectional and time-series heterogeneities. A notable finding is that the implementation of lean management practices significantly reduced operational costs by approximately 15% in certain sectors, with a confidence interval around this estimate being ± 3 percentage points. The empirical evidence supports the effectiveness of implementing lean principles for enhancing cost-effectiveness in manufacturing systems within Senegal. Manufacturers and policymakers should consider adopting lean management practices to improve their operational efficiency and competitiveness. The maintenance outcome was modelled as $Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + v_t + \epsilon_{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African economies, econometrics, fixed effects model, industrial organisation, panel data analysis, productivity measurement, technological change*

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