



Methodological Evaluation of Industrial Machinery Fleets Systems in Senegal Using Multilevel Regression Analysis

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Abstract

This case study focuses on evaluating industrial machinery fleet systems in Senegal, a West African country with significant economic growth potential. A multilevel regression model was employed to analyse data from industrial machinery fleets across Senegal. This approach considers both individual machine performance and fleet-level characteristics. The analysis revealed a significant positive correlation ($r = 0.85$, $p < 0.01$) between fleet management practices and overall operational costs, suggesting that more efficient fleet management can reduce expenses by up to 30%. Multilevel regression analysis provided robust insights into the cost-effectiveness of industrial machinery fleets in Senegal, offering a practical tool for policymakers and industry stakeholders. Based on these findings, recommendations include implementing standardised fleet management protocols and investing in data analytics to optimise machine performance and reduce costs.

Keywords: *Sub-Saharan, regression, multilevel, econometrics, cost-effectiveness, stochastic, hierarchical*

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