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

**Mboup Diop**[1,2], **Kaaré Camara**[1,3]

[1] Université Alioune Diop de Bambey (UADB)

[2] Department of Electrical Engineering, Institut Sénégalais de Recherches Agricoles (ISRA)

[3] Department of Civil Engineering, Institut Sénégalais de Recherches Agricoles (ISRA)

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**Correspondence:** mdiop@gmail.com

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**Author notes**

*Mboup Diop is affiliated with Université Alioune Diop de Bambey (UADB) and focuses on Engineering research in Africa.*

*Kaaré Camara is affiliated with Department of Civil Engineering, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Engineering research in Africa.*

## 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*