



Methodological Assessment of Industrial Machinery Fleets in Senegal: A Quasi-Experimental Approach to Risk Reduction

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Abstract

The industrial sector in Senegal is characterized by a diverse fleet of machinery across various sectors such as manufacturing and construction. Despite this growth, there are concerns about the operational efficiency and safety of these fleets. A mixed-methods approach was employed, combining quantitative data analysis from fleet maintenance records and qualitative interviews with stakeholders. The study used regression analysis to model the relationship between risk factors and fleet performance outcomes. Regression analysis revealed a significant negative correlation ($p < 0.05$) between the frequency of machinery breakdowns and the implementation of comprehensive safety protocols, indicating that proactive measures can effectively reduce operational risks. The findings suggest that integrating advanced risk assessment tools into industrial machinery management could significantly enhance fleet reliability and safety in Senegal. Policy makers are encouraged to implement mandatory safety training programmes for operators and regular audits of machinery fleets, supported by robust financial incentives to encourage compliance with best practices. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \varepsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, fleet management, reliability engineering, stochastic models, predictive maintenance, asset optimization, experimental design*

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