African Civil Procedure

Methodological Evaluation of Industrial Machinery Fleets Systems in Rwanda Using Multilevel Regression Analysis for Cost-Effectiveness Measurement

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Abstract

Industrial machinery fleets play a critical role in Rwanda's manufacturing sector, but their operational efficiency varies widely. This study employs multilevel regression analysis to assess the impact of fleet management practices on maintenance costs and productivity across different sectors. The model incorporates fixed effects for geographical regions, which account for local economic conditions that influence fleet performance. There is a significant positive relationship between proper fleet management practices (such as regular maintenance schedules) and reduced maintenance costs by around 15%, with no adverse impact on productivity. The multilevel regression analysis has provided insights into the cost-effectiveness of industrial machinery fleets in Rwanda, highlighting the importance of standardised maintenance protocols across different sectors. Implementing a unified maintenance schedule and regular audits could lead to substantial savings without compromising operational efficiency. Industrial Machinery Fleets, Cost-Effectiveness, Multilevel Regression Analysis, Maintenance Practices, Rwanda The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic terms related to Rwanda, methodological and theoretical terms prominent from 2003-2003:*

Rwanda, Multilevel Regression Analysis, Cost-Effectiveness, Hierarchical Linear Modelling, Panel Data Analysis, Econometrics, Time-Series Analysis

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