Multilevel Regression Analysis of Adoption Rates in Manufacturing Plants Systems within Senegal: An Empirical Study

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Abstract

Manufacturing plants in Senegal have adopted various systems to improve efficiency and productivity. However, understanding the factors influencing adoption rates at both plant-level and regional levels is essential for policy-making. Data from 100 manufacturing plants across three regions were analysed using multilevel logistic regression models. Hierarchical Bayesian methods were employed to account for the nested structure of data (plants within regions). The analysis revealed significant regional variations in adoption rates, with Region A showing a 25% higher adoption rate compared to Region B. Multilevel regression models provided robust insights into the factors influencing manufacturing system adoption, highlighting the importance of considering both plant-specific and regional contexts. Policymakers should focus on enhancing technological readiness in regions with lower adoption rates and fostering organisational commitment across all regions to improve overall adoption levels. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Senegalese, multilevel, regression, diffusion, econometrics, productivity, geographic*

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