



# Bayesian Hierarchical Model for Measuring Adoption Rates in Nigerian Industrial Machinery Fleets Systems

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## Abstract

In Nigeria's industrial sector, the adoption of advanced machinery systems has shown varying rates across different industries and regions. A Bayesian hierarchical model was employed to analyse data from multiple industrial sectors. The model accounts for both fixed and random effects to estimate adoption rates while considering regional differences. The analysis revealed that machinery adoption varied significantly by industry (e.g., manufacturing versus construction, with a proportion of adoption as high as 75%). This study provides insights into the factors driving machinery adoption and highlights the importance of sector-specific interventions in Nigeria's industrial landscape. Policy makers should prioritise targeted strategies based on industry-specific needs to enhance machinery adoption rates. The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Nigerian, hierarchical, Bayesian, adoption, econometrics, stochastic, simulation

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