Bayesian Hierarchical Model for Measuring Adoption Rates of Industrial Machinery Fleets in Nigeria,

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Abstract

Industrial machinery adoption rates in Nigerian industrial fleets have been studied extensively but often with limited data availability, hindering precise estimates. A Bayesian hierarchical model was developed to account for heterogeneity in adoption rates among various types of machinery and across industries. This approach allows for the incorporation of prior knowledge and robust inference on adoption dynamics. The analysis revealed significant variation in adoption rates, with certain machinery models showing adoption proportions as high as 70% in manufacturing sectors compared to only 35% in agricultural applications. This study demonstrates the effectiveness of Bayesian hierarchical modelling for understanding industrial machinery adoption patterns in Nigeria, offering valuable insights for policy and investment decisions. Future research should expand this model to include more recent data and explore additional factors influencing adoption rates within Nigerian industry sectors. Bayesian Hierarchical Model, Adoption Rates, Industrial Machinery, Nigeria, Engineering The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Bayesian statistics, hierarchical modelling, industrial adoption, predictive analytics, spatial analysis, stochastic processes, Nigeria*

ABSTRACT-ONLY PUBLICATION

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