



# Bayesian Hierarchical Model for Measuring Adoption Rates in Manufacturing Systems Across Kenya: A Methodological Assessment

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## Abstract

This study aims to evaluate adoption rates of advanced manufacturing systems in Kenyan factories using a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse data on manufacturing systems' adoption in multiple regions. The model accounts for spatial and temporal variations through random effects, ensuring comprehensive coverage while maintaining inferential precision. The analysis revealed a significant geographic variation in adoption rates, with urban areas showing higher adoption compared to rural settings, indicating the need for tailored strategies across different geographical contexts. This study underscores the importance of adapting interventions based on regional characteristics to maximise system adoption and productivity improvements. Policy makers should prioritise investment in urban centers where adoption rates are notably higher. Additionally, targeted training programmes could be developed to enhance local capacity for advanced manufacturing technologies. Bayesian hierarchical model, Manufacturing systems, Adoption rates, Kenya, Spatial analysis The empirical specification follows  $Y = \beta_{0+\beta}^T p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Kenya, Bayesian hierarchical model, adoption rates, manufacturing systems, statistical methods, econometrics, geographic information systems*

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