African Ocean Biology (Earth/Environmental Science)

Bayesian Hierarchical Model Assessment in Nigerian Smallholder Farming Systems: Methodological Evaluations and Efficiency Gains Analysis

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Abstract

Smallholder farming systems in Nigeria face significant challenges related to productivity and resource utilization. The review examines the application and validation of Bayesian hierarchical models across various Nigerian smallholder farms. It explores how these models can enhance understanding of resource allocation patterns and operational efficiencies. Bayesian hierarchical models have shown promise in identifying specific areas where efficiency gains can be maximised, with notable improvements in marginal productivity by up to 15% when applied across diverse farming contexts. The Bayesian hierarchical model provides a robust framework for analysing smallholder farm efficiencies, offering insights into resource optimization strategies that could significantly enhance agricultural productivity. Further research should explore the scalability and generalizability of these models in different Nigerian regions to ensure their applicability across varied farming conditions. Bayesian hierarchical model, efficiency gains, Nigerian smallholder farms, environmental science The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Nigerian, Bayesian, Hierarchical, Efficiency, Methodology, Econometrics, Spatial Analysis*

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