African Horticulture Studies (Agri/Plant Science)

Bayesian Hierarchical Model for Cost-Effectiveness Analysis in Uganda's Regional Monitoring Networks Systems

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Abstract

This paper focuses on the methodological evaluation of regional monitoring networks systems in Uganda's agricultural sector, with a specific emphasis on cost-effectiveness analysis. A Bayesian hierarchical model will be employed, incorporating prior knowledge about regional differences and data from various monitoring sites. This approach allows for estimation of the overall cost-effectiveness of the systems under investigation. The analysis reveals significant heterogeneity in resource utilization across different regions, with some areas showing efficiencies that are nearly twice as effective as others in terms of achieving desired outcomes at comparable costs. This study provides a robust framework for assessing cost-effectiveness in regional monitoring networks, highlighting the importance of considering local specificities and variability. The findings suggest the need for targeted interventions to address inefficiencies in less effective regions. Additionally, further research is recommended to validate these conclusions across broader geographical scales. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Uganda, Agricultural Economics, Regional Monitoring Networks, Cost-Effectiveness Analysis, Bayesian Hierarchical Models, Monte Carlo Simulations, Geographic Information Systems*

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