African Swine Veterinary Studies

Methodological Evaluation of Manufacturing Plants Systems in Ghana Using Bayesian Hierarchical Models for Efficiency Gains Analysis

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Abstract

Manufacturing plants in Ghana's agricultural sector face challenges in operational efficiency. A systematic literature review will be conducted to analyse existing methodologies used in assessing efficiency of Ghanaian agricultural manufacturing plants. The study will employ Bayesian hierarchical modelling techniques to estimate efficiency gains across different scales and sectors within the sector. Bayesian hierarchical models have demonstrated a capability for accurately estimating efficiency gains, with some studies reporting increases up to 20% in operational efficiency when using these models compared to traditional methods. The use of Bayesian hierarchical models offers a robust framework for improving efficiency analysis in Ghana's agricultural manufacturing sector. Implementing Bayesian hierarchical models should be encouraged as a methodological advancement, with further research into its application at various scales and sectors within agriculture. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, Bayesian hierarchical models, Methodological evaluation, Operational efficiency, Sustainability assessment, Techno-economic analysis, Utilization studies*