Bayesian Hierarchical Model Evaluation for Yield Improvement in Process-Control Systems in Senegal

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Abstract

Recent advancements in process-control systems have shown promise in improving yield efficiency across various industries, including those in Senegal where resource management is critical. The methodology involves the application of a Bayesian hierarchical model to analyse data from multiple sites within Senegal. This approach accounts for variability between sites while estimating overall yield improvements with robust uncertainty quantification. Bayesian hierarchical modelling revealed significant site-specific variations in yield improvement, with one specific facility achieving an average 15% increase in yield compared to baseline levels. The Bayesian hierarchical model provides a comprehensive framework for understanding and optimising process-control systems in Senegal, offering actionable insights for system enhancements. Based on the findings, we recommend deploying the Bayesian hierarchical model across all relevant sites within Senegal to systematically assess and optimise yield performance. The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Senegal, Hierarchical, Bayesian, Modelling, Optimization, Analysis*

ABSTRACT-ONLY PUBLICATION

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