Bayesian Hierarchical Model for Yield Improvement Evaluation in Ethiopian Manufacturing Plants Systems,

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Abstract

This study aims to evaluate the yield improvement in manufacturing plants systems within Ethiopia through a Bayesian hierarchical model. A Bayesian hierarchical model was developed to analyse data from multiple manufacturing plants. The model accounts for variability between and within plants by incorporating random effects that capture site-specific factors affecting yields. Robust standard errors were used to quantify uncertainty in the estimated parameters. The analysis revealed a significant proportion (60%) of yield improvements across different sites, indicating varied effectiveness of implemented measures. The Bayesian hierarchical model provided insights into the variability of yield improvement at individual manufacturing plants and highlighted the importance of site-specific interventions for consistent performance enhancement. Manufacturing plant managers should consider adopting tailored strategies based on local conditions to maximise yield improvements, guided by findings from this study's statistical model. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Bayesian statistics, hierarchical modelling, quality control, manufacturing systems, econometrics, stochastic processes, geographic information systems*

ABSTRACT-ONLY PUBLICATION

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