African Safety Engineering

Bayesian Hierarchical Model for Yield Improvement in Ghanaian Manufacturing Plants Systems

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Abstract

Manufacturing plants in Ghana face challenges in achieving optimal yield due to variability in operational conditions and process inefficiencies. A Bayesian hierarchical model was employed to analyse data from multiple manufacturing plants. The model accounts for variability across different plants and within each plant's processes. The model revealed that incorporating process optimization techniques could increase the yield by up to 15% in some cases, demonstrating significant potential for improvement. The Bayesian hierarchical model provided a robust framework for identifying yield enhancement strategies in Ghanaian manufacturing environments, offering actionable insights for practitioners and policymakers. Manufacturers should consider implementing process optimization initiatives guided by the findings of this study to enhance operational efficiency and productivity. The maintenance outcome was modelled as $Y\{\}=beta0+beta1X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ghanaian, Bayesian, Hierarchical, Modelling, Yield, Optimization, Quality Control*