African Political Communication (Media/Politics/Social)

Bayesian Hierarchical Model for Measuring Efficiency Gains in South African Manufacturing Plants Systems: A Methodological Assessment

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Abstract

Manufacturing efficiency in South African plants has been a subject of interest for policymakers aiming to enhance productivity and competitiveness. A Bayesian hierarchical model will be employed to estimate the efficiency gains across different plants. The model accounts for both plant-level and industry-wide variability, ensuring robust inference. The analysis revealed significant differences in efficiency levels between smaller and larger manufacturing units within the same sector, with a clear trend towards higher efficiency in medium-sized factories. This study underscores the importance of considering hierarchical structures when assessing manufacturing efficiencies across South African industries. Policymakers should consider implementing targeted interventions for smaller plants to bridge gaps and improve overall industry performance. Bayesian Hierarchical Model, Manufacturing Efficiency, South Africa, Plant-Level Analysis Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *South Africa, Bayesian Hierarchical Models, Methodology, Econometrics, Hierarchical Modelling, Efficiency Measurement, Quantitative Analysis*

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