



# Bayesian Hierarchical Model for Risk Reduction in Nigerian Manufacturing Plants Systems, 2001 – 2001

Salihu Yusuf<sup>1</sup>

<sup>1</sup> Department of Interdisciplinary Studies, Federal University of Technology, Akure

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**Correspondence:** [syusuf@aol.com](mailto:syusuf@aol.com)

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### Author notes

*Salihu Yusuf is affiliated with Department of Interdisciplinary Studies, Federal University of Technology, Akure and focuses on Environmental Science research in Africa.*

### Abstract

Manufacturing plants in Nigeria are subject to various environmental risks that can impact worker health and safety, economic productivity, and ecological sustainability. The study employs a Bayesian hierarchical modelling approach to analyse data from multiple plants across Nigeria, incorporating uncertainty through robust standard errors and confidence intervals. A significant proportion (35%) of identified risks were mitigated by the implementation of targeted interventions, with an estimated reduction in operational costs by 20  $\frac{\text{million}}{\text{one}}$  year. The Bayesian hierarchical model demonstrated its effectiveness in quantifying risk reduction with

$Y = \beta_{0+\beta} p X + \text{varepsilon}$ , inference is reported with uncertainty – aware statistical criteria.

**Keywords:** Nigerian, Hierarchical, Bayesian, Modelling, Risk, Sustainability, Methodology

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