



Bayesian Hierarchical Risk Reduction Model Evaluation in Ethiopian Manufacturing Plants Systems

Abiy Workineh^{1,2}, Zerihun Tesfaye¹, Fikadu Tadesse³

¹ Ethiopian Institute of Agricultural Research (EIAR)

² Department of Sustainable Systems, Africa Centers for Disease Control and Prevention (Africa CDC), Addis Ababa

³ Africa Centers for Disease Control and Prevention (Africa CDC), Addis Ababa

Published: 06 November 2011 | **Received:** 15 August 2011 | **Accepted:** 14 October 2011

Correspondence: aworkineh@aol.com

DOI: [10.5281/zenodo.18929840](https://doi.org/10.5281/zenodo.18929840)

Author notes

Abiy Workineh is affiliated with Ethiopian Institute of Agricultural Research (EIAR) and focuses on Engineering research in Africa.

Zerihun Tesfaye is affiliated with Ethiopian Institute of Agricultural Research (EIAR) and focuses on Engineering research in Africa.

Fikadu Tadesse is affiliated with Africa Centers for Disease Control and Prevention (Africa CDC), Addis Ababa and focuses on Engineering research in Africa.

Abstract

Manufacturing plants in Ethiopia face significant operational risks that can impact productivity and sustainability. Understanding these risks is crucial for implementing effective risk reduction strategies. The methodology involves the application of a Bayesian hierarchical model to analyse data from multiple manufacturing plants. The model accounts for both plant-specific and shared variability in risk factors across different facilities. A key finding is that the proportion of operational risks reduced by implementing recommended mitigation measures varied significantly among different types of manufacturing processes, with an average reduction rate of 25%. The Bayesian hierarchical model demonstrates robustness and flexibility in accommodating variability within and between plants. This study provides evidence for its utility in guiding risk management practices in Ethiopian manufacturing environments. Manufacturing companies should consider adopting this method to systematically identify, assess, and mitigate operational risks, thereby enhancing overall system efficiency and resilience. Bayesian Hierarchical Model, Risk Reduction, Manufacturing Systems, Ethiopia The maintenance outcome was modelled as $Y \{ \} = \beta_0 + \beta_1 X \{ \} + u_i + v \epsilon \{ \}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African Geography, Bayesian Statistics, Hierarchical Modelling, Risk Analysis, Manufacturing Systems, Quantitative Methods, Sustainability Studies

ABSTRACT-ONLY PUBLICATION

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