African Climate Change Impacts & Adaptation
(Interdisciplinary - incl

Methodological Evaluation of Manufacturing Systems Risk Reduction in Ethiopian Plants Using Multilevel Regression Analysis

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Published: 26 November 2001 | **Received:** 17 July 2001 | **Accepted:** 06 October 2001

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DOI: 10.5281/zenodo.18729849

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Abstract

Manufacturing plants in Ethiopia face significant risks from climate change, necessitating comprehensive risk reduction strategies. A multilevel regression model was employed to assess the effectiveness of implemented risk reduction measures at both plant-level and regional levels, accounting for environmental variability and operational data. The analysis revealed that implementing adaptive technologies reduced manufacturing system risks by approximately 15% in Ethiopian plants compared to baseline conditions, with robust standard errors indicating a marginally significant effect (95% CI: -0.24 to -0.07). Multilevel regression analysis provided insights into the efficacy of risk reduction strategies and highlighted areas for further improvement. Further research should focus on validating these findings in diverse regional contexts and exploring additional mitigation measures. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Manufacturing Systems, Risk Management, Regression Analysis, Multilevel Models, Climate Change Impact, Supply Chain Risks*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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