



Methodological Evaluation of Manufacturing Plant Systems in Tanzania Using Multilevel Regression Analysis to Measure Risk Reduction Effects

Kabiru Mwakwaya^{1,2}, Samson Msuya^{3,4}

¹ Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha

² Department of Advanced Studies, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

³ Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

⁴ Department of Advanced Studies, Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha

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Correspondence: kmwakwaya@hotmail.com

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Author notes

Kabiru Mwakwaya is affiliated with Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha and focuses on Environmental Science research in Africa.

Samson Msuya is affiliated with Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam and focuses on Environmental Science research in Africa.

Abstract

Manufacturing plants in Tanzania are significant contributors to environmental degradation, necessitating a methodological framework to assess risk reduction strategies. The study will employ MLRA with fixed effects models, accounting for both plant-level and industry-level variations to measure the impact of implemented mitigation strategies on environmental risks. A preliminary analysis suggests a significant decrease (30%) in pollution levels when multilevel regression techniques are applied compared to traditional univariate methods. The use of MLRA provides a robust and nuanced understanding of risk reduction impacts, offering valuable insights for policy formulation in Tanzania's manufacturing sector. Policy makers should prioritise the adoption of MLRA methodologies to ensure comprehensive assessment of environmental interventions in manufacturing plants. The empirical specification follows $Y = \beta_{0+\beta}^{\vec{p}} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Tanzania, Multilevel Regression Analysis, Environmental Risk Assessment, Sustainable Development, Regression Models, Geographic Information Systems, Quantitative Methods

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