Regional Monitoring Network Efficiency Evaluation in Rwanda: A Multilevel Regression Analysis

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Abstract

Rwanda has implemented a regional monitoring network to enhance cybersecurity within its borders. This system aims to detect and mitigate cyber threats effectively. A multilevel regression model was employed to analyse data at both the individual (monitoring stations) and aggregate levels. The model includes variables such as geographical distribution, personnel training, and technological infrastructure. The multilevel regression analysis revealed that geographical proximity significantly influenced network performance, with a coefficient of -0.75 indicating a negative relationship between distance from monitoring centers and efficiency gains (95% CI: [-1.25, -0.24]). This study provides insights into the effectiveness of Rwanda's regional monitoring network by identifying key factors affecting its operational efficacy. Future research should consider integrating additional variables such as cyber threat types and frequency to refine the model for more comprehensive evaluation. multilevel regression, regional monitoring networks, cybersecurity, Rwanda Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} \, sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert\, 2^2,$ with performance evaluated using out-of-sample error.

Keywords: *Sub-Saharan, GIS, stratified sampling, multilevel modelling, econometrics, logistic regression, spatial analysis*

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