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A Geospatial Tracking Model for Effective Post-Disaster MSME Business Recovery

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Abstract

This study aims to develop a geospatial tracking model based on attribution clustering to address Micro, Small, and Medium Enterprises (MSMEs) affected by ecological disasters, and to examine the determinants of mitigation effectiveness. Employing a quantitative, cross-sectional explanatory design, data were collected via surveys from 238 MSME owners across five Indonesian provinces using stratified random sampling. The study utilized Structural Equation Modeling-Partial Least Squares (SEM-PLS) for hypothesis testing and K-Means clustering integrated with QGIS for spatial attribution modelling. Spatial vulnerability, impact severity, and location accessibility significantly influence mitigation effectiveness. Conversely, disaster attribution and IT capacity lack direct significance but become highly impactful when moderated by spatial data quality. MSME adaptive capacity significantly strengthens mitigation effectiveness against severe impacts. The K-Means model accurately categorized MSMEs into four priority intervention tiers (Silhouette Score = 0.776). This research pioneers the integration of geo-spatial tracking with attribution clustering for post-disaster MSME mitigation. It introduces the novel construct of "disaster attribution score" and shifts the paradigm from static risk mapping to dynamic, severity-based spatial tracking, bridging a critical gap in disaster resilience literature. Policymakers should utilize the proposed Web-GIS dashboard for precise, data-driven resource allocation and invest heavily in high-quality spatial data infrastructure. MSME managers are advised to proactively build internal adaptive capacities, such as emergency savings, to accelerate post-disaster recovery.

Keywords: Geo-spatial tracking, MSME, Mitigation, Disaster Attribution, Business