Level of Compliance of UDM – Emergency Action Team (EAT) on Earthquake Safety Protocols: Basis for the Integration of AI Enhanced Disaster Response System

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Abstract

This study assesses the compliance of the Universidad de Manila-Emergency Action Team (UDM-EAT) with established earthquake safety protocols, including Republic Act No. 10121 (Philippine Disaster Risk Reduction and Management Act of 2010), CHED Memorandum Order No. 9, and Manila Ordinance No. 8323 (Mendoza, 2025; Nielo, 2023). Given the Philippines' vulnerability to seismic events, this research aims to identify strengths and weaknesses in current disaster preparedness practices. Employing a descriptive qualitative design, data were collected through document analysis and semi-structured interviews with EAT and Security Department members (Guardiano, 2023). Findings reveal that while the UDM-EAT generally complies with safety protocols, significant gaps exist in the Security Department's engagement and training (Cruz & Tolentino, 2023). The study highlights the need for improved integration of artificial intelligence (AI) technologies to enhance disaster response capabilities (Ivić, 2023). An AI-enhanced disaster response system, termed "Seismic Sentinel," is proposed to facilitate real-time monitoring, predictive alerts, and coordinated emergency responses. This research contributes to the improvement of institutional resilience and readiness, ensuring better protection for the academic community during seismic events.

Keywords: *disaster risk reduction, earthquake safety, compliance assessment, Universidad de Manila, Seismic Sentinel, AI-enhanced emergency response*

INTRODUCTION

The Philippines is highly prone to devastating seismic activity due to its position along the Pacific Ring of Fire (PHIVOLCS, 2023). Historic earthquakes such as the 1990 Luzon and 2013 Bohol earthquakes underscore the urgency for higher education institutions (HEIs) to implement robust disaster risk reduction and management (DRRM) measures (Wikipedia, 2024a; Wikipedia, 2024b). This study evaluates the Universidad de Manila Emergency Action Team's (UDM-EAT) adherence to three key earthquake safety

policies: Republic Act No. 10121 (2010), CHED Memorandum Order No. 9, s. 2013, and Manila Ordinance No. 8323 (City Council of Manila, 2013; Commission on Higher Education, 2013).

Despite the presence of strong legislative frameworks, gaps persist in practical implementation—particularly in real-time communication, post-drill evaluations, and clarity of personnel responsibilities (Cruz & Tolentino, 2023; Ramos & De Castro, 2022; Nielo, 2023). In response, this study identifies both strengths and weaknesses in UDM-EAT's compliance and proposes the integration of a custom-built, AI-enhanced disaster response system named *Seismic Sentinel*. Designed using an Input–Process–Output (IPO) model, this system integrates predictive analytics, automated communications, and real-time seismic alerts to support institutional resilience and compliance (Gómez et al., 2023; Ivić, 2023; Garcia & Tan, 2023). By aligning DRRM policies with emerging technologies, the initiative aims to create a safer academic environment and serve as a scalable model for other HEIs in the country (Bhandari, 2022; Rentschler et al., 2023).
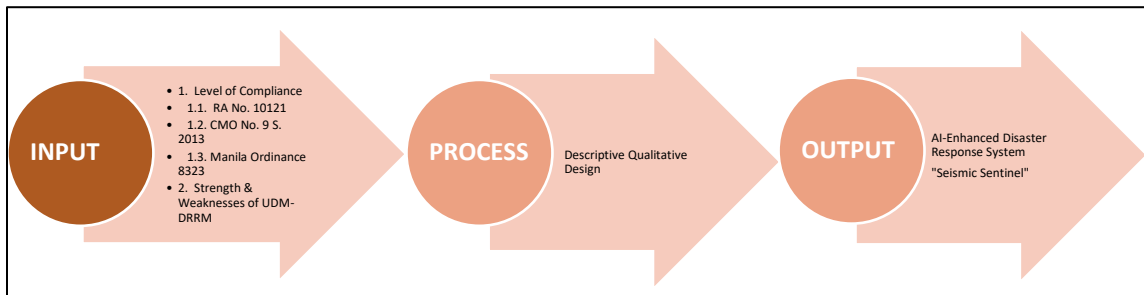

INPUT
- 1. Level of Compliance
- 1.1. RA No. 10121
- 1.2. CMO No. 9 S. 2013
- 1.3. Manila Ordinance 8323
- 2. Strength & Weaknesses of UDM-DRRM

PROCESS
Descriptive Qualitative Design

OUTPUT
AI-Enhanced Disaster Response System "Seismic Sentinel"

Figure 1. Paradigm of the Study (IPO Model)

LITERATURE REVIEW

This study is grounded in a broad literature base on disaster preparedness in higher education institutions (HEIs), emphasizing institutional procedures, legal mandates, and the strategic use of artificial intelligence (AI) in emergency response. At the core of the analysis is Republic Act No. 10121, which mandates a multi-stakeholder, community-based approach to disaster risk reduction (Republic Act No. 10121, 2010). However, research by Mendoza (2025), Nielo (2023), Sala et al. (2025), and Guardiano (2023) points to persistent challenges in implementation including fragmented coordination, insufficient resource allocation, and weak communication infrastructure despite formal DRRM plans in place. These gaps highlight the need for agile, AI-supported systems that enable real-time decision-making, inter-agency collaboration, and oversight.

CHED Memorandum Order No. 9, s. 2013, likewise mandates the integration of DRRM into instruction, extension, and student support services (Commission on Higher Education, 2013). Yet, many HEIs struggle to operationalize this directive effectively. As Victor et al. (2023) argue, disaster readiness requires more than compliance on paper it necessitates accessible technologies, routine drills, and functional communication tools to protect academic communities.

Furthermore, the localized application of national DRRM mandates under Manila Ordinance No. 8323 has produced uneven outcomes. While DRRM committees and awareness efforts exist, studies show a lack of tailored communication tools and limited student engagement (Mendoza & Cruz, 2023; Rivera & Santos, 2022). These findings support the value of gamified learning tools, interactive formats, and digital platforms in fostering a safety-conscious campus culture.

The literature consistently affirms the transformative potential of AI in DRRM. Authors such as Ivić (2023), Smith and Lee (2024), Chen and Kumar (2024), and Garcia and Tan (2023) illustrate how AI enhances real-time monitoring, predictive analytics, situational awareness, and disaster communication systems. Tools like GIS-integrated platforms and AI-driven applications such as *Methods Matcher* are shown to mitigate the inherent limitations of conventional emergency response models—specifically those related to speed, precision, and human error.

Lastly, the formal reconstitution of UDM's Emergency Action Team under Administrative Order No. 33, s. 2025, represents a strategic move toward institutional resilience. By defining roles, ensuring regulatory alignment, and promoting interdepartmental coordination, the university has laid a foundation for the integration of AI-enhanced response frameworks. This positions UDM-EAT as a critical component in the university's campus-wide preparedness agenda and supports the current study's goal of assessing compliance while proposing innovative technological interventions.

METHODOLOGY

Research Design

Institutional compliance levels were evaluated using a **descriptive-evaluative** study approach, which is commonly employed in educational policy assessments and program evaluations (Assessment of the Implementation of the Student Affairs and Services, 2023). To ensure a comprehensive evaluation of UDM-EAT's earthquake preparedness, a **mixed-method** research design was adopted, integrating both **quantitative** data from structured Likert-scale surveys and **qualitative** data derived from interviews and document analysis. This triangulation of methods aligns with established disaster research methodologies and enhances the study's validity by capturing both statistical trends and contextual insights (Bhandari, 2022; Cruz, Delgado, & Velasco, 2022).

Respondents

Participants in the study were purposefully selected from the university's Security Department and the Universidad de Manila Emergency Action Team (UDM-EAT). Only employees who were actively engaged in disaster risk reduction and management (DRRM) operations were included in the surveys and interviews to ensure relevant and informed responses.

Data Collection Instruments

Data were gathered through a 4-point Likert scale survey (with 1 denoting noncompliance and 4 denoting complete compliance), semi-structured interviews with DRRM officers and unit heads, and document analysis of administrative orders, compliance reports, and internal communications. This triangulated approach ensured both the breadth and depth necessary to document compliance procedures and institutional readiness (Cruz & Tolentino, 2023; Mendoza & Cruz, 2023; Guardiano, 2023).

Data Analysis

To determine compliance levels, weighted means were calculated to analyze responses from the quantitative survey. The weighted mean was computed using the following formula:

$$\text{Weighted Mean (WM)} = \frac{\sum(f \times x)}{\sum f}$$

Where:

- f = frequency of each response
- x = weight assigned to each scale point (e.g., 1 = Noncompliant, 4 = Fully Compliant)
- $\sum$ \sum $\sum$ = summation symbol

The researcher was able to assess the level of compliance with each policy indicator and synthesize Likert-scale data using this method (Ramos & De Castro, 2022).

Responses from semi-structured interviews and document reviews were subjected to thematic analysis to analyze the qualitative data. To find important themes like operational strengths, coordination gaps, and training needs, data were coded and categorized. The institutional execution of disaster risk reduction and management procedures was nuancedly illuminated by this technique (Cruz & Tolentino, 2023; Guardiano, 2023).

RESULTS

An assessment was conducted to evaluate the conformity of the Universidad de Manila Emergency Action Team (UDM-EAT) and the Security Department with key earthquake preparedness policies, including Republic Act No. 10121, CHED Memorandum Order No. 9 (s. 2013), and Manila Ordinance No. 8323. Results revealed varying levels of adherence, with UDM-EAT generally demonstrating higher compliance compared to the Security Department.

Table 1. Level of Compliance

Indicator	UDM-EAT WM	Security Dept. WM	Interpretation UDM-EAT	Interpretation Security Dept.
Conduct of earthquake drills	3.82	1.6	Fully Complied	Complied
Reporting and documentation	3.75	2.91	Fully Complied	Complied
Coordination with city DRRM	3.73	2.87	Fully Complied	Complied
Planning and preparedness	3.65	2.76	Fully Complied	Complied

Availability of information	3.45	2.67	Complied	Complied
Overall Weighted Mean (OWM)	3.68	2.76	Fully Complied	Complied

The results presented in Table 1 indicate that the Universidad de Manila Emergency Action Team (UDM-EAT) demonstrates strong compliance with earthquake preparedness policies, as evidenced by formal recognition, active participation in drills, and effective coordination with local Disaster Risk Reduction and Management (DRRM) agencies. Its documentation and reporting processes are well-established, aligning with best practices in institutional disaster preparedness (Mendoza & Cruz, 2023; Cruz & Tolentino, 2023). Conversely, the Security Department, though generally compliant, exhibits limited involvement in planning and drills, relies on outdated informational materials, and performs weak post-drill evaluations. These deficiencies underscore the need for enhanced integration and focused training programs to improve overall institutional readiness (Ramos & De Castro, 2022; Villanueva & Bautista, 2022).

CONCLUSION AND RECOMMENDATION

Conclusion

The Universidad de Manila Emergency Action Team (UDM-EAT) demonstrates a high level of compliance with established earthquake safety protocols mandated by CHED Memorandum Order No. 9 (2013), Republic Act No. 10121 (2010), and Manila Ordinance No. 8323 (2013). The team shows significant adherence to disaster risk reduction and management (DRRM) regulations, particularly in documentation, coordination, and strategic alignment. Formally reconstituted under Administrative Order No. 33 (2025), UDM-EAT reflects a clear institutional commitment to organized emergency response and resilience (Mendoza & Cruz, 2023; Republic Act No. 10121, 2010; City Council of Manila, 2013). However, notable deficiencies persist within the Security Department, including limited early involvement in disaster planning, low participation in training, and inconsistent access to safety resources, which undermine the effectiveness of emergency protocols and overall DRRM implementation (Ramos & De Castro, 2022; Villanueva & Bautista, 2022). The proposed integration of AI-powered tools such as the "Seismic Sentinel" system offers a scalable solution to address these technological and operational gaps by enhancing situational awareness, accelerating response times, and ensuring compliance through GPS-based evacuation guidance, real-time seismic alerts, and unified communication platforms (Chen & Kumar, 2024; García & Tan, 2023; Gómez et al., 2023). This study concludes that proactive, technology-driven preparedness must supersede mere procedural compliance to achieve true institutional resilience, positioning UDM as a potential leader in higher education disaster preparedness through AI-enhanced DRRM frameworks (Ivić, 2023; Smith & Lee, 2024).

Recommendations

The study's findings lead to several actionable recommendations to enhance UDM's earthquake preparedness and enable the integration of an AI-powered disaster response system:

1. **Implement AI Monitoring Tools**
   Adopting real-time seismic detection and automated decision-support systems can significantly

improve the Emergency Action Team's responsiveness and protocol adherence (Chen & Kumar, 2024; Gómez et al., 2023; Smith & Lee, 2024).

2. **Integrate Security in Planning**
   Early engagement of the Security Department in DRRM planning and simulation is critical for ensuring comprehensive readiness beyond mere implementation roles (Villanueva & Bautista, 2022; Ramos & De Castro, 2022).

3. **Conduct Realistic Earthquake Drills**
   Regular, inclusive campus-wide drills simulating actual emergencies, supported by feedback mechanisms and observer checklists, enhance performance evaluation and preparedness (Mendoza & Cruz, 2023; Rivera & Santos, 2022).

4. **Improve Visibility of Safety Materials**
   Updating and clearly displaying evacuation maps, signage, and safety guidelines increases awareness and compliance, particularly when integrated into handbooks and orientations (Nielo, 2023; Victor et al., 2023).

5. **Centralize Monitoring and Reporting**
   A unified documentation system for attendance, drill feedback, response times, and compliance reporting facilitates transparent oversight and coordination with local DRRM offices (Sala et al., 2025; Cruz, Delgado, & Velasco, 2022).

6. **Enhance EAT Orientation Programs**
   Regular orientation and re-orientation sessions focusing on role clarity, coordination, and communication protocols strengthen operational readiness (Victor et al., 2023; Villanueva & Bautista, 2022).

7. **Establish Post-Drill Debriefing Protocols**
   Institutionalizing structured post-event reviews allows for reflection, performance assessment, and data-driven improvements (Boin et al., 2019; Ramos & De Castro, 2022).

8. **Launch an Earthquake Communication Strategy**
   Sustained awareness campaigns through infographics, bulletins, classroom reminders, and digital platforms maintain earthquake safety as a constant priority within the university community (Nielo, 2023; Mendoza, 2025).

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