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Agile Governance for Disaster Management in Higher Education: Insights on Literacy, Preparedness, and Student Roles in Ternate

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Abstract

Ternate Island, located in the volcanic area, faces persistent disaster risks from Mount Gamalama's activity, urbanization pressures, and climate change impacts, requiring adaptive and collaborative governance in higher education disaster management. This descriptive quantitative study surveyed 117 Geography Education students from two universities in disaster-prone areas of Ternate using an online questionnaire to measure participation in disaster training, perceptions of Agile Governance, disaster literacy, and personal preparedness, analyzed through descriptive statistics. Results showed only 42% of students had attended university-led disaster training, while perceptions of Agile Governance averaged 77%, disaster literacy 74%, and preparedness 76%, with the highest score on technology-supported systems (82%) and active policy evaluation involvement (77%). However, dissemination of official disaster information was relatively low (69%), and preparedness practices such as evacuation planning (72%) and storing emergency supplies (76%) were driven more by individual initiative than structured institutional support. These findings suggest a gap between positive perceptions and actual preparedness practices, highlighting the need for systematic interventions. It is recommended that universities integrate mandatory simulation-based disaster training into the academic calendar, strengthen two-way communication channels, utilize digital tools for real-time alerts, and formalize student roles in disaster governance forums. Such measures, aligned with Agile Governance principles, can transform student engagement from passive recipients to proactive actors, fostering a resilient, responsive, and sustainable university disaster management system.

Keywords: agile governance; disaster literacy; disaster management; student preparedness; Ternate island

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Introduction

Ternate island, located in the volcanic area has a high level of disaster vulnerability due to the activity of Mount Gamalama which has erupted 75 times since 1510 (Lessy et al., 2024; Riasasi et al., 2021). This vulnerability is further exacerbated by urbanization pressures in densely populated urban areas, especially in the eastern part of Ternate island, which increases the risk of eruptions and secondary disasters such as landslides and tsunamis (Sihasale et al., 2023; Suhermat et al., 2024). Although the government has initiated various mitigation efforts, such as evacuation routes and disaster education, geographical challenges and limited access still hinder the effectiveness of emergency handling (Hariyono, 2022; Rahmat et al., 2023). Climate change also adds to the complexity of risks by triggering extreme

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weather and coastal erosion, so risk reduction strategies must be designed in an integrated manner (Rakuasa & Pakniany, 2022). Therefore, a disaster management system that is agile, coordinated, and able to adapt quickly to changes in the situation is needed. Every community, both formal such as educational and government institutions, and non-formal such as community organizations and youth groups, has a strategic role in building collective resilience. Strengthening local capacity through collaboration, training, and the development of flexible procedures is key to dealing effectively and sustainably with various potential disasters.

Universities have a strategic role in building a culture of disaster preparedness through capacity building, information dissemination, and active involvement of the academic community. By integrating disaster risk reduction materials into the curriculum, universities are able to produce a generation that is responsive and trained to deal with environmental threats (Ghimire et al., 2023). Apart from being an educational center, universities are also a research vehicle that produces mitigation strategies based on local needs and cross-sector collaboration (Escobar et al., 2023). Seeing the complexity of disaster risk in the current era, universities are no longer enough to be a center for knowledge transfer, but must also be the driving force for dynamic disaster governance. For this reason, a leadership and management system is needed that is flexible, participatory, and able to respond quickly to changes. The establishment of a framework that enables cross-unit collaboration, data-driven decision-making, and active student engagement is a strategic step in realizing alert, responsive, and sustainable university governance system.

Literature Review

Agile governance is an adaptive, collaborative, and responsive governance paradigm designed to address crisis dynamics swiftly and effectively. This approach prioritizes flexibility in decision-making, multi-stakeholder engagement, and the capacity to adjust to changing operational conditions. In contrast to conventional governance, which often operates through rigid bureaucratic procedures, agile governance empowers institutions to act in real time by leveraging digital technologies and precise data (Wang et al., 2023). Such a model underscores the pressing need for institutional transformation capable of navigating complex uncertainties, particularly within the context of disaster management (Maulana et al., 2023). Therefore, agile governance represents a strategic framework for institutions seeking to maintain operational resilience in volatile environments.

In the higher education context, agile governance is operationalized through three interrelated indicators. Adaptiveness reflects the institution's capacity to revise plans, curricula, and operational protocols in response to evolving threats or altered disaster scenarios (Saptarini & Mustika, 2023). Collaboration entails coordinated engagement between university leadership, faculty, students, government agencies, and non-governmental organizations to ensure a cohesive and inclusive disaster response system. Data-drivenness signifies the strategic use of real-time information such as hazard monitoring dashboards and

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vulnerability mapping to guide timely and evidence-based decisions (Widowati et al., 2021). When integrated, these indicators form a governance mechanism that is simultaneously flexible and structured, enabling universities to respond effectively under uncertainty.

This model is particularly pertinent to disaster-prone environments such as Ternate Island, where communities face recurrent volcanic eruptions, earthquakes, and cascading hazards. Universities in such regions require agile management systems encompassing both disaster preparedness and rapid response capabilities. Technological innovations such as early-warning systems, risk-monitoring platforms, and online training modules enhance the speed and reach of information dissemination while enabling efficient cross-sector coordination (Kartika et al., 2023). Empirical evidence demonstrates that the combination of procedural flexibility and technology-driven support can significantly accelerate institutional recovery in the aftermath of crises (Bounthavong et al., 2023). Consequently, agile governance serves as both a preventive and responsive mechanism in higher education disaster management (Sukardi & Sajida. 2023).

Aligned with their mandate to foster a culture of preparedness, universities can leverage agile governance to broaden academic community participation in disaster risk reduction. Through mitigation-focused curricula, scenario-based planning, simulation exercises, research projects, and community engagement initiatives, higher education institutions can function as central nodes in advancing disaster literacy and resilience (Emaliyawati et al., 2022; Nafisah, 2021). Furthermore, cross-disciplinary collaboration within these institutions fosters the development of innovative, context-specific strategies that enhance preparedness and operational adaptability (Boddy et al., 2024). In this way, agile governance facilitates the integration of disaster readiness into the academic fabric of the university.

Students occupy a strategically significant role within the university disaster management systems, functioning both as direct participants in preparedness activities and as agents of risk literacy dissemination. Their involvement in training sessions, drills, and awareness campaigns enhances personal readiness while strengthening collective institutional response capacities (Emaliyawati et al., 2022). Additionally, students amplify the reach of disaster education through peer networks and digital communication channels, thereby extending preparedness messaging beyond university boundaries (Rijal et al., 2020). Institutionalizing these roles such as through dedicated student-led disaster units ensures that agile governance principles are embedded within daily university service operations (Pahleviannur, 2019).

Despite these advantages, existing literature on university disaster preparedness predominantly emphasizes infrastructure and policy frameworks, with comparatively limited attention to student-led contributions. Similarly, the systematic application of agile governance through its pillars of adaptiveness, collaboration, and data-drivenness remains rare in higher education disaster management, particularly in geologically complex contexts such as Ternate Island, where Mount Gamalama's volcanic activity and rapid urbanization amplify risk (Deni et al., 2019). Addressing this research gap, the present study investigates

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the integration of agile governance into university preparedness systems, positioning students as central actors in resilience-building. This approach not only contributes to the theoretical enrichment of governance discourse but also provides practical insights for the formulation of sustainable, context-specific preparedness strategies for universities in high-risk regions (Rakuasa & Pakniany, 2022).

Method

This study employed a descriptive quantitative approach with a survey method. According to Sugiyono (2020), a quantitative approach is used to investigate a specific population or sample with numerical and measurable data collection techniques. Tanzeh & Arikunto (2020) emphasized that the descriptive method aims to systematically, factually, and accurately describe the facts and characteristics of a particular population. In this context, the survey method was chosen because it can collect student perceptions and knowledge broadly and objectively regarding the university disaster management. This study aims to describe the implementation of Agile Governance in university preparedness, particularly from the perspective of students in higher education institutions located in disaster-prone areas of Ternate Island. The quantitative approach is considered appropriate for identifying research variables and statistically measuring relationships or tendencies. Therefore, this study measured four main indicators: (1) experience in participating in disaster training or socialization organized by the univerity, (2) perception of the application of Agile Governance in university disaster management, (3) disaster literacy and knowledge, and (4) student preparedness for disasters.

The population in this study comprised all active students of the Geography Education Study Program at two reputable universities located in disaster-prone areas of Ternate Island. These institutions were purposively selected due to their relevant characteristics, namely strategic geographic location and curriculum relevance to disaster issues. The sampling technique applied was purposive sampling, which involves determining samples based on specific criteria (Ummah, 2019). The criteria included: active student status, enrollment in the Geography Education Study Program, and involvement in learning or activities related to disaster issues. A total of 117 students participated in this study by completing an online questionnaire distributed via Google Forms.

The research instrument was a closed-ended questionnaire consisting of 15 Likert-scale statements to measure indicators 1 to 4, and one additional yes/no question for the first indicator. The Likert scale was arranged into four categories: 1 = Disagree, 2 = Slightly Disagree, 3 = Agree, and 4 = Strongly Agree. Prior to data collection, the instrument underwent content validity testing through expert judgment involving three specialists in disaster management and education. Feedback from these experts was used to refine the clarity, relevance, and alignment of each item with the research objectives. Construct validity testing showed that all items had correlation coefficients greater than the r-table value, indicating that

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they were valid in measuring the conceptual dimensions of Agile Governance, disaster literacy, and student preparedness.

Reliability testing of the instrument was conducted using Cronbach's Alpha to assess internal consistency. Following Nunnally's (1978) guideline, an alpha value above 0.70 is considered acceptable for research purposes. The test produced a Cronbach's Alpha of 0.93, which is well above the threshold, indicating excellent internal consistency and stability in the measurement. This confirmed that the questionnaire was both valid in representing the research constructs and reliable in producing consistent responses from participants.

The data obtained were analyzed using quantitative descriptive techniques, presenting frequency and percentage values for each indicator. For the first indicator (experience in disaster training), data were presented in the form of yes/no responses and percentage distributions. The results aimed to provide a comprehensive overview of student involvement levels, individual preparedness, and the effectiveness of applying Agile Governance principles in university governance system.

Result and Discussion

This study reveals a portrait of student disaster preparedness in the university environment, with an emphasis on four main indicators: disaster training, perception of agile governance, disaster literacy, and individual readiness. The results showed that although most students had a positive perception of the university disaster system and relatively good personal preparedness, there were significant gaps in the training and dissemination aspects of formal information

Table 1. Results of Literacy Level Processing, Agile Governance Perception, and Student Preparedness for University Management in Facing Disasters

Indicators/Statements	Total Amount	Ideal Quantity	Percentage (%)
Have Participated in Disaster Training/Socialization from University?		Yes:42%	No: 58%
Perception of Agile Governance			
The university has a flexible and adaptive disaster management system	353	468	75%
University is able to respond quickly to emergency situations	348	468	74%
Students are involved in the formulation/evaluation of policies	360	468	77%
Information is delivered quickly and accurately to students	367	468	78%

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Technology is used to support early warning systems	383	468	82%
University leaders are open to student input	364	468	78%
Total/ Average Agile Governance/ Average	**2175**	**2808**	**77%**
Disaster Literacy and Knowledge			
Knowing the main types of disasters in Ternate City	364	468	78%
Understand evacuation procedures on university	350	468	75%
Knowing the location of the evacuation gathering point	340	468	73%
Have received official information from the university	324	468	69%
Able to distinguish valid information from hoaxes	363	468	78%
Total/ Average Disaster Literacy	**1741**	**2340**	**74%**
Student Preparedness			
Have a personal plan for evacuation	336	468	72%
Know who to contact in the event of a disaster	356	468	76%
Storing emergency supplies	354	468	76%
Willing to participate in disaster simulations	368	468	79%
Total/ Average Preparedness	**1414**	**1872**	**76%**

Source: Author, 2025

The most striking findings appeared in indicators of training participation or disaster socialization. Only 42% of students stated that they had participated in the training conducted by university. This percentage is relatively low and indicates the lack of institutional intervention in building student capacity systematically. In fact, direct training is an important foundation in shaping readiness to face real situations in the field. The low participation can be attributed to the lack of information dissemination from the university. Evidently, only 69% of students admitted to having received official information from the university related to disasters. This indicates that institutional communication has not run optimally. This gap has the potential to weaken coordination and response effectiveness when disasters occur.Nevertheless, students' perception of the university disaster system is relatively good. An average of 77% of students consider that the university already has a disaster management system that is flexible, responsive, and technology- supported . This shows that students feel the existence of digital systems, such as communication groups or evacuation alarms. Technology support is the indicator with the highest achievement, which is 82%. This

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reinforces that students feel the presence of digital devices, but this perception is not necessarily directly proportional to the operational understanding of the system, especially if it is not supported by direct training.

Then as many as 77% of students feel involved in the evaluation or preparation of disaster management policies. This is a pretty good number and shows that there is a space for participation from below that is used by some students. This engagement can be an entry point to encourage a more collaborative agile governance model. The level of disaster literacy of students is quite good with an average of 74%. Students generally know the types of disasters that are prone to occur in the Ternate area and understand the importance of evacuation. However, access to official information from the university is still low. This inequality risks creating confusion of information when a disaster occurs.

In terms of individual preparedness, 72% of college students have a personal plan for evacuation. In addition, 76% of respondents stated that they have emergency equipment. This shows an awareness of disaster risk mitigation, although it is shaped more by self-awareness than institutional support. Then, as many as 79% of students stated that they were willing to take part in a disaster simulation if it was organized by the university. This is a positive signal to design participatory programs that actively involve students in preparedness activities. Overall, the integration between indicators shows that perceptions of the university system have not been fully supported by formal literacy and systematic training. Therefore, universites need to develop strategic policies, such as mandatory training, increased dissemination of official information, and student involvement in disaster policy forums.

Although students show a positive perception of the university disaster system, this is not fully in line with effective preparedness practices. Many of them feel safe and protected by the mechanisms available, but this perception is often not based on hands-on experience or formal training in disaster management. Research shows that college students tend to have high optimism about their safety, even though they do not have a deep understanding of risk mitigation, evacuation, and emergency response (Widyastuti et al., 2023). This indicates a false sense of preparedness that can be dangerous if not immediately balanced with systematic educational interventions. As explained by Turner, (2020), direct experience through disaster training has been proven to be able to increase students' sense of personal responsibility and confidence in dealing with crisis situations. Unfortunately, there are still many universities that have not integrated disaster risk reduction (DRR) education into the curriculum as a whole, so that student preparedness is more shaped by subjective perceptions than factual competencies (Ilo et al., 2020). In fact, strengthening DRR education is not only able to equip students cognitively, but also train psychological readiness and practical skills that are very crucial in responding to disasters. Therefore, in order for students' perceptions of the university disaster system not to stop at the discourse level, institutional commitment is needed to develop a training strategy that is simulation-based, technology-assisted, and integrated in the higher education system (Ashcroft et al., 2020).

One of the most crucial weaknesses in the university disaster system is the low level of student participation in formal training organized by the institution. This lack of involvement

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reflects the weakness of institutional interventions in building student preparedness systematically. In fact, effective training, especially those involving simulation and hands-on practice, has been shown to significantly increase participants' knowledge and readiness (Susilawati, 2020). Student participation rates are still relatively low, creating a gap between awareness of the importance of disasters and real involvement in training initiatives. This lack of involvement also has an impact on students' low confidence in responding to emergency situations, as shown in the study Jatmika et al., (2024) which emphasized the importance of continuous training in improving disaster mitigation readiness in each institution.

The lack of disaster training in tertiary institutions has an impact on the low preparedness of cross-disciplinary students, due to the lack of formal training interventions (Kaviani et al., 2021). Even more broadly, Kazempour et al., (2021) noted that disaster training isemains inadequately implemented across disciplines in educational institutions (Nastain & Aini, 2024). Therefore, colleges need to take serious steps to make disaster training a mandatory component that is not only informative, but also encourages active student engagement. Building a culture of preparedness requires consistent institutional efforts to provide structured, experiential training, and encourage students from passive positions to proactive roles in dealing with disasters (Korzycka et al., 2021). Ultimately, embedding comprehensive disaster training within higher education not only enhances individual competencies but also fortifies collective resilience, ensuring that universities evolve into proactive hubs of disaster risk reduction and preparedness that extend their impact beyond the university to the wider community (Misbachul et al., 2025).

Students show great potential as participatory actors in the university disaster system, especially through their involvement in evaluation and policy formulation in line with the principles of Agile Governance. This approach emphasizes flexibility, collaboration, and responsiveness, which can be reflected in student participation in simulations, policy assessments, and disaster training (bin Saad et al., 2021). Such involvement not only strengthens institutional preparedness, but also helps create policies that are more contextual and based on the real needs of the university community (Pang et al., 2021). In addition, (Efendi et al., 2019)emphasized the importance of agility and continuous renewal in disaster governance, which can be optimized through direct input from students as part of a rapid feedback cycle. Thus, the active involvement of students is not just symbolic, but an important foundation in building a sustainable and resilient culture of preparedness (Karaca & Kastan, 2025).

Disaster literacy and individual student preparedness show a positive trend, but unfortunately most of them arise from personal initiative, rather than from the systematic support of institutions. This mismatch can weaken the effectiveness of mitigation if it is not accompanied by a structured institutional framework (Hidayat et al., 2023). Studies show that students' understanding of disasters is often theoretical and under-reinforced by formal training or simulations provided by universities (Ismail et al., 2019). On the other hand, simulation-based training has been shown to increase individual confidence and readiness in

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dealing with emergency situations (Dwie Susila et al., 2019), so that systematic training is an urgent need. Therefore, a holistic preparedness strategy must combine individual awareness with institutional support so that university resilience does not depend solely on student self-reliance, but also on a coordinated and sustainable system (Ningtyas et al., 2021).

These findings provide a strong foundation for the formulation of the university preparedness policies that are more inclusive, adaptive, and oriented towards student empowerment. To address gaps in training practices and information dissemination, mandatory training-based approaches need to be systematically integrated into the academic calendar, so that building preparedness becomes part of the institution's culture, not just an ancillary activity. Institutional communication also needs to be strengthened through effective, establishing two-way communication channels and utilizing digital technology to ensure equal reach across the entire university community.. In addition, the involvement of students in the planning, implementation, and evaluation of disaster programs must be formalized so that their voices become part of strategic decision-making (Sabtian et al., 2024). By adopting the principles of Agile Governance, higher education institutions can build a more responsive, collaborative, and sustainable disaster management system, while producing a young generation that is not only prepared for disasters, but also actively contributes to collective risk management (Nashihah et al., 2023).

Conclusion

Agile Governance offers a strategic framework for strengthening university disaster management, yet this study's findings indicate that its application in the surveyed universities has not been fully supported by structured training and systematic information dissemination. The analysis revealed that although most students demonstrated positive perceptions and awareness of disaster risks, their actual preparedness is still predominantly shaped by personal initiative rather than coordinated institutional mechanisms. This pattern suggests that, in the absence of consistent institutional interventions, disaster management in universities risks remaining reactive instead of anticipatory. Strengthening preparedness therefore requires not only policy refinement but also a cultural transformation in which disaster readiness is embedded as an integral element of university life. To address this gap, universities in disaster-prone areas should institutionalize mandatory simulation-based training within the academic calendar, develop two-way communication systems, utilize digital platforms for timely alerts, and formalize student participation in disaster governance. Embedding these measures within the Agile Governance framework can transition student engagement from passive awareness to active, coordinated preparedness, thereby fostering a university culture that is resilient, adaptive, and responsive to evolving disaster risks.

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