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Disaster Management in Tourism: Public-Private Collaboration and Early Warning Innovations in Bali and Yogyakarta

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Abstract: This study examines public-private collaboration in tourism disaster management in Bali and Yogyakarta, Indonesia—two major tourism regions highly vulnerable to natural disasters. Using a multiple-case study approach, the research incorporates semi-structured interviews and focus group discussions with stakeholders. Findings reveal differences in disaster preparedness shaped by policies, industry structures, and resource capacities. Applying Collaborative Governance Theory, the study highlights the importance of structured stakeholder engagement in achieving shared goals, pooling resources, and ensuring accountability. It also emphasizes the potential of integrating Indonesia's early warning technologies—such as MHEWS, BMKG's tsunami and weather alerts, and PVMBG's volcano hazard warnings—into localized disaster management frameworks. Public-private collaboration at national and regional levels is crucial for enhancing resilience in tourism-dependent areas. By aligning collaborative efforts with technological advancements, this study provides valuable insights for improving disaster management, safeguarding the tourism industry, and promoting sustainable tourism.

Keywords: tourism; early warning; disaster management planning; Bali; Yogyakarta

1. Introduction

Tourism is a highly volatile industry, susceptible to external shocks that can disrupt operations and influence visitor perceptions (Hall et al., 2023). Hospitality and tourism businesses are required to remain vigilant, continuously monitoring and preparing for unforeseen events. However, this is challenging

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due to the complexity of managing multiple threats while handling substantial day-to-day operational concerns. The unpredictability of disasters further complicates planning, as preparing for every possible event is impractical. Resource constraints often limit businesses' capacity to develop comprehensive contingency plans (Hall et al., 2023).

In Indonesia, Bali and Yogyakarta are among the most popular tourist destinations, attracting domestic and international visitors (Kausar et al., 2023). However, as illustrated in Figure 1, these regions are highly vulnerable to natural disasters. Bali, located east of Java Island, and Yogyakarta, in the southern part of Java, lie at the convergence of tectonic plates—the circum-Mediterranean and circum-Pacific seismic zones. This geographical position makes them prone to earthquakes and volcanic eruptions (Buchholz, 2023).

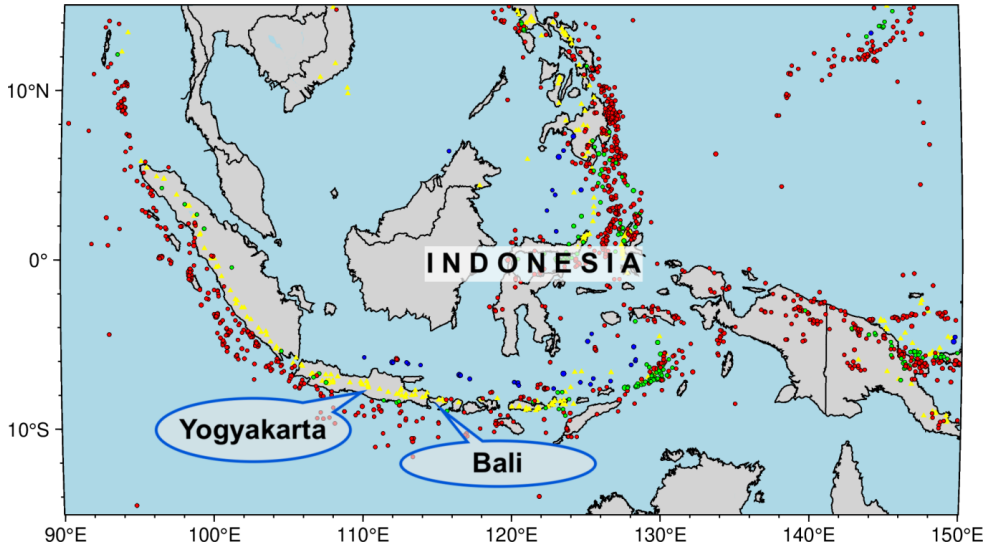

Figure 1. Locations of Bali and Yogyakarta at the convergence of tectonic plates and the Pacific Ring of Fire. Yellow triangles represent volcanoes, while red, green, and blue dots indicate earthquake occurrences with magnitudes above five from 2020 to 2024 (Source: Author's own plotting using geoscience data from USGS, visualized with Generic Mapping Tools, 2024).

Despite their vulnerability, these regions significantly emphasize tourism, making disaster preparedness a critical concern for ensuring safety and sustainability. However, a gap remains in understanding how the tourism industry collaborates with government entities to effectively plan and manage disaster risks, especially in disaster-prone countries like Indonesia. Prior studies have underscored the importance of integrated tourism planning and collaborative approaches involving various stakeholders (Hall, 1999; Prideaux et al., 2021).

In Indonesia, disasters are broadly categorized into natural and social disasters. Natural disasters are divided into hydrometeorological hazards, such as floods, droughts, and tropical storms, and geological hazards, such as earthquakes, tsunamis, and volcanic eruptions. Meanwhile, social disasters, such as pandemics, conflicts, and terrorism-related incidents, fall under different governance and response mechanisms. For natural disaster risk reduction, Indonesia has adopted a data custodianship approach, where specific national agencies are assigned as data stewards for different disaster types, ensuring that authoritative and reliable information is disseminated efficiently. For example, Badan Meteorologi, Klimatologi dan Geofisika (BMKG or Meteorology, Climatology, and Geophysical Agency in English) serves as the primary custodian for weather-related hazards, providing real-time updates on extreme weather events, flood risks, and drought conditions through the website cuaca.bmkg.go.id. On the other hand, the Pusat Vulkanologi dan Mitigasi Bencana Geologi (PVMBG or Center for Volcanology and Geological Hazard Mitigation in English) is responsible for monitoring volcanic activity and issuing alerts via the Indonesia platform (https://magma.esdm.go.id), a specialized application that provides detailed information on volcanic status, seismic activity, and hazard zones.

A significant initiative by the Indonesian government to address disaster risks is the development of structured early warning systems (EWS) that facilitate preparedness and response across administrative levels. Badan Nasional Penanggulangan Bencana (BNPB or National Agency for Disaster Countermeasure in English) has developed the Multi-Hazard Early Warning System (MHEWS) to integrate multi-source hazard data into a centralized disaster knowledge management system (dkms.bnpb.go.id). Despite the availability of these national-level systems, their effective utilization at the regional and local levels remains challenging—especially in tourism-dependent areas. Local governments have the potential to transform national datasets into localized, actionable information to support real-time hazard communication strategies (Kefan & Jia, 2014).

By integrating national early warning data with destination-specific risk assessments, local tourism offices could develop real-time visitor hazard communication strategies, including automated alerts, digital platforms, and multilingual warning systems. Kefan and Jia (2014) also proposed four principles for responding to regional tourism emergencies, which include the fulfilment of social responsibility, rapid reaction, experience accumulation, and synergic response, all of which justify the utilization of EWS data at the local level.

This paper aims to explore the key concerns of the tourism industry in Indonesia regarding disaster management planning and to explore the potential of integrating Indonesia's EWS technologies into localized disaster management frameworks to enhance preparedness and response. It seeks to identify the roles of the tourism industry within the framework of collaboration with government agencies. By conducting a comparative analysis with a specific focus on stakeholders in Bali and Yogyakarta, this study addresses gaps in understanding differences in disaster awareness, preparedness, and collaborative practices between the two provinces. The findings contribute to the literature by offering insights into how regional differences in policies, industry structures, and resource capacities influence disaster preparedness and the effectiveness of public-private collaborations in the tourism sector.

2. Literature Review

Tourism businesses operate in environments vulnerable to external shocks such as natural disasters, pandemics, and political instability, which can disrupt operations and affect visitor perceptions (Hall et al., 2023). The challenge for these businesses lies in balancing immediate operational concerns with the need for long-term risk management strategies. Hall (1999) emphasizes that integrated tourism planning requires collaborative and interactive approaches across various organizational levels to foster effective partnerships.

Planning for disasters is inherently difficult due to their unpredictability. It is impractical for businesses to prepare for every possible threat, particularly for small and medium-sized enterprises (SMEs) with limited resources (Hall et al., 2023). To address these challenges, Prideaux et al. (2021) propose a "learning destination" approach, where communities collaborate to build collective resilience against future crises.

Studies on disaster management in tourism have been increasing compared to years ago when seminal works in this area began to emerge, such as those by Faulkner and Vikulov (2001) and Ritchie (2004). However, research employing early warning system (EWS) datasets to inform strategy and policy for disaster management in the Indonesian tourism context remains relatively limited. Previous studies have shown efforts to develop an Android-based, community-driven early warning system in a village in Bali (Mutiarani et al., 2025) and capacity-building initiatives among communities living near Kelut Volcano (Priyono & Lestari, 2017). However, there is little documentation on using EWS for local tourism sectors, as noted by Kefan and Jia (2014) in China and Johnston et al. (2007) in the United States. Hence, this study emphasizes the potential of EWS in disaster management planning for the local tourism industry, contributing to the discourse on tourism disaster management planning.

Bali and Yogyakarta, key contributors to Indonesia's tourism industry, are in high-risk areas for natural disasters. These regions significantly contribute to their respective provincial economies, mainly through the accommodation and food sectors (BPS Yogyakarta, 2023; BPS Bali, 2023). However, Yogyakarta's vulnerability was starkly highlighted by the 2006 earthquake, which caused over 5,700 fatalities, and its proximity to the active Mount Merapi further exacerbates the risks. Similarly, Bali faces significant threats from volcanic eruptions, earthquakes, and tsunamis (Kriswati et al., 2022). These recurring disasters underscore the urgent need for effective disaster management planning in the tourism sector, including using early warning systems to mitigate risks.

Early warning technologies are critical in disaster preparedness, as they provide timely information to reduce risks and enhance response strategies. Several systems tailored to specific hazards have been developed in Indonesia, including daily weather forecasts, extreme weather warnings, earthquake and tsunami alert systems, volcano hazard alerts, and the Multi-Hazard Early Warning System (MHEWS). These technologies offer significant opportunities for integration into local disaster management frameworks, enabling tourism stakeholders to respond proactively to potential threats.

Resilience, defined as the ability to recover from shocks through adaptability and flexibility, varies among businesses and destinations. SMEs often lack the resources to implement early warning systems effectively, whereas larger organizations with established disaster management protocols exhibit greater readiness (Cochrane, 2010; Kausar et al., 2024). At the destination level, resilience reflects maintaining economic stability despite external disruptions (Prideaux & Beirman, 2024). Integrating early warning technologies into tourism operations can enhance resilience, particularly in high-risk areas such as Bali and Yogyakarta.

Collaboration between the tourism industry and government is vital for effective disaster management. Bajracharya et al. (2012) argue that such partnerships build resilience through shared risk awareness, resource pooling, and technological integration. Studies highlight the significant role of hotels in disaster risk management through partnerships with local governments, though challenges such as limited resources persist (Nguyen et al., 2017; Nguyen et al., 2018). Incorporating early warning systems into these collaborations has the potential to improve preparedness, as demonstrated by successful initiatives where technology complements public-private planning efforts (Takamatsu, 2024). By integrating early warning technologies and fostering collaborative frameworks, destinations like Bali and Yogyakarta can strengthen their disaster management capabilities, ensuring sustainable tourism operations despite recurrent natural disasters.

3. Method and Theory

3.1 Methods

This study employs a multiple-case study approach to investigate the collaborative roles of the public and private sectors in tourism disaster management in Bali and Yogyakarta, focusing on the integration of early warning technologies. According to Ridder (2017), multiple-case studies facilitate theoretical replication by selecting cases that predict contrasting results, enhancing the robustness and generalizability of the findings. This approach is particularly suitable for exploring complex social phenomena, such as disaster management, within real-life contexts (Yin, 2018).

Bali and Yogyakarta, two premier tourist destinations in Indonesia, were selected for their contrasting characteristics. Bali, a globally renowned destination, attracts a larger international tourist population and frequently hosts high-profile international events, necessitating stringent safety and disaster preparedness requirements. Conversely, Yogyakarta primarily caters to domestic tourists and hosts fewer international events. These differences allow for a comparative examination of how variations in tourist demographics, event profiles, and disaster risks influence collaborative disaster management practices and the adoption of early warning technologies.

Data were collected through semi-structured interviews and focus group discussions (FGDs). Two FGDs were conducted in 2023—one in Yogyakarta and one in Bali (Photo 1). The discussions involved 9 experts in Yogyakarta and 10 experts in Bali, representing a range of institutions including the Provincial Tourism Offices, Regional Planning Agencies (BAPPEDA), Regional Disaster Management Agencies (BPBD), and several tourism industry associations such as: Association of Hotels and Restaurants (PHRI), Association of Indonesian Tour and Travel Agencies (ASITA), Association of Tour Guides (HPI). These participants were recommended by the respective Provincial Tourism Offices based on their expertise, institutional roles, and ability to represent their organizations. Focus group discussions were held with experts and practitioners in tourism and disaster management to facilitate in-depth discussions on collaborative practices, challenges, and strategies for disaster preparedness and response.

Photo 1. Documentation of interviews at the BPBD office and field assessment process at Bali National Golf Club (BNGC), Nusa Dua (Source: Devi Kausar, 2022).

These discussions provided diverse perspectives and enriched the data with practical insights into integrating early warning systems within the local tourism sectors. Key topics included regulatory mechanisms, stakeholder involvement and collaboration, challenges in tourism disaster management, and EWS integration.

The collected data were analyzed using thematic analysis, a qualitative method that identifies, analyzes, and reports patterns (themes) within the data (Braun & Clarke, 2006). This process involved the following steps: [1]. Familiarization with Data: Transcribing interviews and FGDs, reading and re-reading the data, and noting initial ideas; [2]. Generating Initial Codes: Systematically coding interesting data features across the entire dataset [3]. Searching for Themes: Collating codes into potential themes and gathering all data relevant to each theme [4]. Reviewing Themes: Ensuring themes align with coded extracts and the entire dataset [5]. Defining and Naming Themes: Refining each theme's specifics and shaping the overall narrative; [6] Producing the Report: Selecting compelling data extracts, conducting final analyses, and relating the findings to the research questions and literature. The main themes identified were collaborative management through public-private partnerships, early warning systems, and regional differences.

The multiple-case study approach is well-suited for exploring disaster management practices in Bali and Yogyakarta, as it captures the complexity of public-private collaborations and the contextual differences between the

regions. The study identifies patterns and variations in disaster preparedness, public-private collaboration, and early warning technologies by selecting cases with contrasting characteristics. The findings offer actionable insights into improving disaster management practices in tourism-dependent regions.

3.2 Theory

This study draws on Collaborative Governance Theory as a foundational framework for analyzing the interactions among public and private stakeholders in tourism disaster management. Collaborative Governance Theory emphasizes the necessity of structured engagement among multiple actors, fostering shared objectives, mutual accountability, and the pooling of resources to address complex societal challenges (Ansell & Gash, 2008). This theoretical lens is particularly useful in illuminating how collaborative efforts can be mobilized to tackle the multifaceted risks associated with disasters in tourism-dependent regions.

In the context of tourism disaster management, the relevance of Collaborative Governance Theory becomes especially apparent. Tourism destinations such as Bali and Yogyakarta, which are highly vulnerable to natural hazards, require coordinated action among government agencies, tourism businesses, and community groups to mitigate risks effectively. The theory provides a structured approach for these stakeholders to jointly design and implement preparedness, response, and recovery strategies, thereby addressing the unpredictable nature of disasters—a notion supported by Ritchie (2004), who underscores the strategic importance of cross-sector collaboration in crisis management.

A key aspect of this collaborative framework is the integration of early warning systems (EWS) into disaster management strategies. The adoption of national-level systems—such as Indonesia's Multi-Hazard Early Warning System (MHEWS), BMKG's weather and tsunami alerts, and PVMBG's volcano hazard notifications—demonstrates how technological innovations can enhance coordinated action and timely information sharing. This integration not only improves overall disaster resilience but is also supported by Faulkner and Vikulov's (2001) framework on tourism disaster management stages, which highlights the critical role of early preparedness in minimizing disaster impacts.

Context-specific challenges further underscore the need for adaptive governance mechanisms within this framework. In Bali and Yogyakarta, differences in economic profiles, stakeholder capacities, and regulatory environments necessitate tailored collaborative approaches. Ultimately, the application of Collaborative Governance Theory not only provides an analytical lens but also offers practical guidance for policy and operational improvements. By emphasizing structured engagement, shared decision-making, and adaptive resource management, the

theory underpins recommendations for integrating early warning systems into local disaster management frameworks. In doing so, it advances our understanding of how public-private partnerships can enhance resilience in tourism-dependent regions, ensuring that stakeholders are better equipped to address the evolving challenges posed by natural disasters (Ritchie, 2004).

4. Results and Discussion

This study uncovered significant insights into the collaborative roles of public and private sectors in tourism disaster management in Bali and Yogyakarta, with particular emphasis on adopting early warning technologies (Photo 2). The findings reveal contrasts in how these two regions address disaster preparedness, influenced by their distinct organizational capacities, tourism demographics, and levels of resource availability.

Photo 2. Illustration of the 2021 installation of a buoy-based Coastal Acoustic Tomography system on the eastern coast of Bali, implemented under the Indonesia Tsunami Early Warning System program (Source: Agustan, 2021).

4.1 Collaborative Disaster Preparedness Efforts through Public-Private Collaboration

This study identified key differences in how Bali and Yogyakarta approach disaster preparedness in the tourism sector. Governance structures, financial resources, and industry composition shape these differences.

In Bali, disaster preparedness is reinforced by regulatory mechanisms such as the Certification for Disaster Preparedness for Tourism, Business, and Other Service Providers, issued by the Bali Provincial Disaster Management Office (BPBD). Since its introduction in 2014, more than 60 tourism-related businesses—including hotels, convention centers, and golf resorts—have obtained this certification, ensuring compliance with minimum safety standards. Many of these establishments are concentrated in Nusa Dua, Sanur, and Kuta, where disaster preparedness measures align with international event safety requirements.

In contrast, Yogyakarta's disaster preparedness efforts primarily rely on informal networks rather than institutionalized certifications. The tourism industry in Yogyakarta is dominated by small and medium-sized enterprises (SMEs), which often lack the financial and technical resources to implement comprehensive disaster management protocols. While some international hotel chains in Yogyakarta adhere to internal safety standards, no province-wide certification program is equivalent to Bali's. Instead, preparedness measures depend on initiatives from individual businesses and local tourism associations.

In Bali and Yogyakarta, hotel associations play a pivotal role in disaster risk reduction by working closely with government agencies to enhance preparedness among their members. Four- and five-star hotels, categorized as high-risk establishments, must adhere to construction and building codes issued by the Ministry of Public Works and Housing. Compliance is certified through a Certificate of Worthiness, granted upon successful surveillance by central authorities. Table 1 compares the key disaster preparedness characteristics of Bali and Yogyakarta.

Table 1. Comparison of Key Disaster Preparedness Characteristics of Bali and Yogyakarta

No.	Aspect	Bali	Yogyakarta
1.	Certification for Disaster Preparedness	BPBD Certification since 2014	No formal certification
2.	Tourism Industry Composition	Large hotels, international chains, and resorts	Predominantly SMEs, budget hotels, and cultural tourism
3.	Government Involvement	Strong engagement through BPBD Bali	Limited direct engagement
4.	Early Warning System Utilization	Integrated with SOPs in high-risk areas	Available but not formally incorporated into tourism planning
5.	Challenges	High certification costs, economic recovery post-pandemic	Limited financial and technical resources

Comparisons in Table 1 indicate Bali's more structured disaster management frameworks and adoption of early warning technologies due to greater international exposure and the economic incentives that come with it. However, this comes with challenges, such as the financial burden of certification compliance. For instance, while BPBD provides certification at no cost, associated training expenses (e.g., first aid, cardiopulmonary resuscitation (CPR), and evacuation drills) are borne by businesses, which may deter smaller establishments from participating. A hotel representative in Nusa Dua, Bali, said during an interview:

> *"Although the certification itself is free, the training costs associated with the certification are quite burdensome. Especially since we have just recovered from the pandemic. Having some assistance from the government for this training will be helpful for us"* (Rustiana, personal communication, 22 August 2022).

Contrastingly, in Yogyakarta, the key challenge lies in limited integration between tourism businesses and government agencies. Interviews with hotel managers revealed that, despite the availability of national early warning systems (e.g., BMKG's tsunami alerts and PVMBG's MAGMA platform), there is no systematic mechanism for relaying these warnings to tourism operators in real time.

To address these gaps, tourism industry representatives interviewed for this research suggested integrating disaster preparedness certification into the Cleanliness, Health, Safety, and Environmental Sustainability (CHSE) framework introduced after the COVID-19 pandemic. This approach would standardize safety measures while minimizing redundancy across different regulatory programs. During a focus group discussion, the suggestion to incorporate disaster preparedness certification came from a representative of the Indonesia Hotel General Manager Association (IHGMA) and an official from the Deputy of Destination and Infrastructure Development at the Ministry of Tourism, Republic of Indonesia. Specifically, the IHGMA representative stated:

> *"There is already the CHSE certification, so it would be better to incorporate disaster preparedness into the Safety component of this certification. This would help reduce redundancy and ensure efficiency"* (Sukma, personal communication, 19 September 2022).

4.2 Integration of Early Warning Technologies

The effective integration of EWS into tourism disaster management remains a key challenge. Nevertheless, there are some examples of EWS Use in Tourism:

1. Bali's Tsunami Early Warning SOPs. Coastal hotels and resorts in Bali's Nusa Dua and Sanur areas are equipped with BPBD tsunami sirens and are connected to BMKG's early warning alerts. In addition, hotels with BPBD disaster certification are required to conduct quarterly evacuation drills, which include response protocols for tsunami alerts. Some large-scale tourism businesses, such as Bali International Airport, have direct communication lines with BNPB and BMKG to receive real-time hazard updates.
2. Yogyakarta's Volcanic Hazard Communication System. Due to its proximity to Merapi Volcano, one of the most active volcanoes in the world, PVMBG's MAGMA Indonesia application is beneficial in providing real-time volcanic hazard warnings. However, interviews with hotel managers in Kaliurang (near Mount Merapi) indicate gaps in information dissemination, as there are no automated warning mechanisms to relay volcanic status updates to visitors.

Localized early warning dissemination mechanisms could significantly improve disaster preparedness in high-risk tourism destinations, where the intersection of geological hazards and mass tourism necessitates a proactive, technology-driven disaster communication strategy. This would enhance visitor safety and build resilience within tourism sectors by ensuring that businesses and stakeholders receive timely and accurate disaster information.

4.3 Regional Differences and Collaborative Governance

The findings of this study contribute to the development of collaborative governance theory (CGT) by demonstrating its applicability in tourism disaster management within developing economies. While CGT traditionally emphasizes structured engagement, shared goals, and mutual accountability among stakeholders (Ansell & Gash, 2008), this study highlights context-specific adaptations required in tourism-dependent regions prone to disasters.

First, regulatory enforcement plays a pivotal role in fostering collaboration. In Bali, provincial-level mandates, such as the BPBD Certification for Disaster Preparedness, create a structured framework that encourages businesses to align with disaster management goals. On the other hand, Yogyakarta lacks a similar regulatory mechanism, illustrating how collaborative governance can be constrained by the absence of formalized policy frameworks. This underscores

the importance of regulatory scaffolding in enabling effective stakeholder collaboration.

Second, economic incentives shape stakeholder engagement in disaster preparedness. Resource constraints inhibit voluntary participation in disaster management initiatives in regions such as Yogyakarta, where SMEs dominate tourism. In contrast, Bali's high-profile international tourism market generates stronger economic motivations for businesses to comply with disaster resilience standards. This suggests that CGT in tourism contexts must account for market-driven collaboration incentives, particularly in regions where government enforcement mechanisms are weak.

Third, this study reveals SMEs' critical but underexplored role in collaborative disaster governance. While CGT often assumes that stakeholders engage in governance through formal institutional arrangements, our findings suggest that SMEs predominantly rely on informal networks and industry associations to access disaster information and resources. This indicates the need to refine CGT frameworks to better account for bottom-up, informal collaboration mechanisms that emerge in resource-constrained tourism settings. This study extends CGT beyond its conventional applications by incorporating these context-specific adaptations. It offers a framework for analyzing tourism disaster governance in regions with limited formal institutional capacities.

4.4 Implications for Disaster Management

The findings highlight several key policy recommendations to enhance disaster resilience in tourism-dependent regions. However, implementing these measures presents significant challenges for SMEs, which usually account for a significant portion of the tourism industry. Some of the targeted strategies include the following.

1. Develop a centralized tourism disaster information platform. One of the best practice examples is Thailand's Andaman Sea Tsunami Warning Network (Hanka et al., 2010), where tourism stakeholders receive real-time hazard updates. However, in the context of the tourism industry, which comprises a significant portion of SMEs, the challenge is the lack of dedicated personnel or systems to monitor and interpret real-time disaster warnings. To overcome this issue, it is suggested that local governments develop an integrated mobile-friendly platform that consolidates hazard information from BMKG, PVMBG, and BNPB and automatically disseminates alerts to registered tourism businesses.
2. Introduce phased compliance for disaster preparedness certification or another institutionalized mechanism to ensure compliance with safety standards. The financial burden of compliance may discourage SMEs

from participating in certification programs. Therefore, governments could allow gradual compliance with basic safety standards before advancing to higher certification levels. One of the best practice examples is Japan's Tourism Business Continuity Planning (TBCP) framework, which provides SMEs with subsidized training and phased compliance incentives (The World Bank, 2020; Matsuoka, 2022). For years, business continuity plans, which consist of actions and processes an organization needs to follow during an unplanned event, have been the focus of many studies in Japan as the country is prone to natural disasters (Asano, 2012; Goromaru et al., 2021).

3. Expand access to financial and technical support for SMEs. Limited financial capacity prevents SMEs from investing in disaster mitigation infrastructure such as emergency communication systems and evacuation plans. To overcome this, the government can establish disaster preparedness grant programs for SMEs to invest in resilience measures. Tourism industry associations can collaborate to develop affordable disaster risk financing options.
4. Formalize public-private crisis communication networks. SMEs often rely on informal channels for disaster information, leading to communication delays. Tourism industry associations can establish formal communication protocols, including WhatsApp-based crisis alert groups or SMS broadcast systems for rapid information dissemination.

In addition to the four strategies suggested, clear and comprehensive disaster management guidelines tailored to the tourism sector are also essential. Such guidelines should be developed collaboratively, involving input from government agencies, private sector stakeholders, and community representatives to ensure practical and applicable solutions. Addressing policy overlaps and improving communication channels during crises are equally critical. Streamlining responsibilities and eliminating redundancies would enhance efficiency and reduce resource wastage, particularly in regions with limited capacities.

Furthermore, fostering a culture of disaster awareness is vital. Drawing inspiration from community-based disaster education models in countries like Japan, Indonesia could invest in public education campaigns and community engagement initiatives. These efforts would build a collective understanding of disaster risks and empower stakeholders to take proactive measures. Strengthening public-private collaboration is another key recommendation. Establishing dedicated crisis management organizations within the tourism sector, involving private stakeholders' active participation, could improve coordination and resilience.

5. Conclusion

This research concludes that significant regional differences exist in how Bali and Yogyakarta develop disaster preparedness within their tourism sectors. These disparities stem from policies, industry structures, resource capacities, and stakeholder engagement variations. As a prominent international tourism hub, Bali exhibits a more advanced approach to disaster preparedness due to its strong international market presence, stringent safety requirements, and greater integration of disaster management standards. In contrast, with its predominantly domestic tourism base and reliance on small and medium-sized enterprises (SMEs), Yogyakarta faces more significant challenges in adopting comprehensive disaster management practices.

The study highlights that even under Indonesia's unified national disaster management framework, regional characteristics such as international tourism demand, industry composition, and local governance significantly influence disaster preparedness levels and stakeholder priorities. These findings emphasize the need for tailored approaches to disaster management that account for regional contexts and capacities.

By applying Collaborative Governance Theory, this study underscores the importance of structured public-private partnerships in fostering resilience in tourism-dependent regions. Integrating early warning technologies, such as Indonesia's Multi-Hazard Early Warning System (MHEWS), has been identified as a critical component of effective disaster preparedness. However, its successful implementation requires enhanced coordination, clear communication channels, and more significant support for SMEs to address resource constraints.

These findings contribute to the growing body of tourism and disaster management planning literature by offering comparative insights from two distinct regions within the same country. Practical implications for policymakers and industry stakeholders include developing comprehensive disaster management guidelines, fostering a culture of disaster awareness, and strengthening public-private collaborations.

While this study provides valuable insights into disaster management practices in Bali and Yogyakarta, its scope is limited to these regions. Future research could explore similar dynamics in other tourism destinations within and outside Indonesia to validate the findings and provide a broader perspective. Quantitative studies assessing the effectiveness of specific disaster management practices, particularly integrating early warning systems, could also enhance understanding and guide policymaking.

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