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COLLABORATIVE GOVERNANCE OF DISASTER MANAGEMENT TOWARD LOCAL RESILIENCE: THE CASE OF RESEARCH ON LUMAJANG REGENCY, INDONESIA

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Abstract: This study aims to investigate the dynamics of collaborative governance in disaster management and its contribution to enhancing local resilience, with a specific focus on Lumajang Regency, Indonesia. A qualitative method was adopted to analyze the interactions, coordination, and shared responsibilities among diverse stakeholders, including local government agencies, community-based organizations, the private sector, and civil society, in responses to and recovery from disasters, particularly volcanic eruptions and floods that recurrently affected the region. Data were gathered through in-depth interviews, focus group discussions, and document analysis with key stakeholders in Lumajang's disaster management ecosystem. The results showed that shared leadership, mutual trust, institutional capability, and community participation contributed to the implementation of collaborative governance in Lumajang Regency. This study also identified major challenges, such as poor coordination, inequitable resource distribution, and inconsistent policy implementation. Despite these issues, Lumajang demonstrated resilience through adaptive learning, inclusive engagement, and the strengthening of inter-organizational networks. Furthermore, the analysis indicated that enhancing collaborative governance structures was crucial for improving disaster preparedness, response, and recovery at the local level. The results provided valuable insights for policymakers and practitioners sourcing to improve disaster resilience through multi-actor engagement in Indonesia and other similarly disaster-prone regions.

Keywords: Collaborative Governance, Disaster Management, Local Resilience, Stakeholders

Introduction

Natural disasters are becoming an increasingly complex and multidimensional global challenge. Over the past two decades, the frequency and intensity of disasters have increased sharply, leading to widespread social, economic, and environmental losses. According to the Global Assessment Report on Disaster Risk Reduction, an average of 350 to 500 medium- and large-scale disasters occur annually worldwide with economic losses reaching USD 170 billion and over 1.2 million fatalities recorded in the last 20 years (Harijoko et al., 2021). In addition to natural factors, structural vulnerabilities such as development inequality, environmental degradation, and weak institutional systems have continued to intensify the impact of disasters (Bealt et al., 2016). This situation underscores the need for a collaborative risk management approach that includes various actors and sectors [3];[4].

Indonesia remains one of the most disaster-prone countries in the world, due to its geographic location at the confluence of three active tectonic plates and along the equator. This makes the country particularly vulnerable to earthquakes, tsunamis, volcanic eruptions, floods, and droughts (Thouret et al., 2023). During 2023, the National Disaster Management Agency (BNPB) recorded 5,400 disasters across Indonesia with the majority being hydrometeorological (BNPB, 2023). Although a legal framework is in place through Law Number 24 of 2007 on Disaster Management, its implementation still faces challenges at the regional level, including limited infrastructure, weak coordination, and an unintegrated logistics data system (Subiyakto et al., 2025). Differences in institutional capacity between regions also outline the need

for a more contextual and responsive approach, particularly in logistics, as the backbone of a successful emergency response (Ida et al., 2025).

East Java Province is part of the regions with the highest disaster intensity in Indonesia due to a combination of geological and hydrometeorological risks. The location along the volcanic mountain range and the southern coast makes the province prone to earthquakes, volcanic eruptions, floods, and landslides. East Java Regional Disaster Management Agency (BPBD) recorded an average of more than 500 disasters annually, most of which affected rural areas (BPBD Provinsi Jawa Timur, 2025). Lumajang Regency is a key disaster hotspot due to its location on the slopes of Mount Semeru and the most active volcano on Java Island (Hariyono et al., 2025). A major eruption in late 2021 led to 51 fatalities, 169 injuries, and thousands of homes damaged (Ida et al., 2025). Furthermore, cold lava floods and the potential for a tsunami kept Lumajang on disaster alert for most of the year. In 2023, 119 disasters were recorded with peak intensity in the first quarter of the year (BPBD Kabupaten Lumajang, 2025).

Disaster management emphasizes the importance of a collaborative method between actors, not a rapid technical response (Dai & Azhar, 2024). In practice, all phases of the disaster management cycle including mitigation, preparedness, emergency response, and rehabilitation require coordinated cross-sectoral work [10];[11]. UNDP (2013) referred to this concept as disaster risk governance, which hinges on communication, clearly defined roles, and mutual trust between actors (Pal & Shaw, 2017). However, in many regions, this type of collaborative work has not been effective due to rigid bureaucracy, sectoral egos, and a lack of open participation [13];[14]. The situation was evident in Lumajang Regency during Mount Semeru eruption, which showed weak inter-agency logistics coordination. BPBD, Social Services Agency, and Disaster Risk Reduction Forum (Forum PRB) were not operating optimally during this period [15];[8]. Aid distribution was delayed due to overlapping authority, unsynchronized data, and the lack of an integrated information system (Hariyono et al., 2025).

Based on the identified issues, this study aims to examine the implementation of collaborative governance in supporting disaster management logistics in Lumajang Regency. The analysis also focuses on formulating a collaborative logistics governance model based on actor dynamics in the local context. The two main questions addressed in this study are:

(1) How does collaboration between actors operate in disaster logistics management?

(2) How can a collaborative governance-based logistics model be developed to strengthen regional resilience?

The results are expected to contribute to policy development at the local and national levels, as well as enrich academic discourse on collaborative governance in the context of disasters in developing countries.

Collaborative Governance of Disaster Management

Collaboration has become a crucial method in modern governance, particularly when governments face challenges such as disasters. Ansell and Gash (2008) defined collaborative governance as a form of joint work that combined the state and non-state actors in an equal and participatory decision-making process (Ansell & Gash, 2008). In the context of disasters, this method is considered crucial because no single actor can handle the entire disaster management process independently. Emerson et al. (2012) further explained that effective collaboration required three key components, namely the capacity for collective action, shared motivation, and a space for open dialogue (Emerson et al., 2012).

Disaster management is not only response efforts but also how various stakeholders collaborate in advance to prepare for potential hazards. It generally comprises four main

stages namely mitigation, preparedness, emergency response, and rehabilitation-reconstruction (BNPB, 2023). In practice, the success of disaster management is determined not only by the speed of response but also by how the actors can build cross-sectoral synergy in a structured and sustainable manner (Djalante et al., 2013). Inter-agency coordination, clear role allocation, and community participation mechanisms are key factors in ensuring timely and targeted aid logistics (Meriläinen, 2017);(Tangney et al., 2023).

Studies on collaborative governance in disaster management have been conducted in various national contexts (Emerson et al., 2012). In the United States, this model was implemented in federal policy management through cooperation between government levels (McGuire, 2006). In Japan, collaboration between the local government, the local community, and volunteers was key to the emergency response following the 2011 tsunami (Shaw, 2013). In Indonesia, collaborative practices have been introduced into Disaster Risk Reduction (DRR) programs. However, the publications still face challenges such as the dominant role of the government, weak community participation, and unclear inter-agency coordination schemes (Djalante et al., 2017).

Emerson and Nabatchi (2015) developed a theoretical framework for understanding collaborative governance, consisting of three main components. This includes system context, collaborative governance regime (CGR), and collaborative dynamics (Emerson & Nabatchi, 2015b). The system context comprises external factors such as political and socio-economic conditions, legal frameworks, and resource capacity that shape the collaborative space. Furthermore, CGR describes the collaborative governance structure formed due to the dynamics of collaboration. Collaborative dynamics further comprise the interaction processes between actors, such as principled engagement, shared motivation, and joint capacity, which are central to successful collaboration (Emerson & Nabatchi, 2015a).

In the context of disasters, collaborative dynamics are crucial where cross-sector cooperation is required to be rooted in trust, shared understanding, and a commitment to action (Wang, 2020). According to Thomson & Perry (2006), effective collaboration requires interdependence, trust, and conflict resolution mechanisms (Thomson & Perry, 2006). Inclusive leadership, adaptive institutional procedures, and equitable resource distribution are also crucial (Crum et al., 2011);(Vega & Roussat, 2015). Otherwise, collaboration will remain a mere formality without any real impact on disaster management performance.

Although this concept has been widely discussed internationally, studies on collaborative governance in disaster logistics systems in Indonesia are still limited. Studies tend to focus on technical aspects of logistics, such as procurement and distribution of aid, rather than on the design of inter-actor governance, as the mainstay of the system's sustainability (Hidayat et al., 2023);(Subiyakto et al., 2025). The effectiveness of a logistics system depends heavily on coordination capacity, clear role allocation, and participatory mechanisms between institutions. Therefore, studying collaborative governance in the context of disaster logistics management is relevant and urgent for strengthening local resilience in the face of disasters.

Method

This study adopted a qualitative method (Creswell & Creswell, 2022) using a case study strategy to examine the implementation of collaborative governance in disaster management in Lumajang, East Java. Lumajang was selected as the study location based on the vulnerability to disasters, particularly Mount Semeru eruption and cold lava floods, as well as the complexity of actors in disaster logistics management. The

data collection techniques were in-depth interviews, participatory observation, and document studies. The main informants were representatives from BNPB, East Java BPBD, Lumajang Regency Head, as well as the heads and staff of Lumajang Regency BPBD and other regional agencies in the disaster management cycle. The participation of non-governmental organizations such as Disaster Risk Reduction Forum (Forum PRB), Disaster Response Operations Control Center (Pusdalops PB), civil society organizations (CSO), philanthropic institutions, the private sector, higher education institutions, and local media also served as significant sources of information that reflected the dynamics of cross-sector collaboration.

The data collected were analyzed using thematic analysis to identify patterns, relationships, and the dynamics of collaboration among actors in the disaster logistics system. The roles and interactions of stakeholders were mapped using the collaborative governance framework by Ansell and Gash (2008), which comprised elements such as initial conditions, institutional arrangements, face-to-face dialogue, trust-building, shared commitment, and the achievement of intermediate outcomes. Data triangulation was employed by comparing sources and methods to ensure the validity and reliability of the findings. Through the approach, this study aimed to understand how collaboration was fostered in a complex local context and to uncover the factors that either enhanced or hindered local resilience in the face of disasters.

Results

System Context and Drivers

Collaboration in disaster management logistics governance in Lumajang Regency was influenced by various interrelated external factors (system context). Regional policies determined the direction of cross-agency work, while the existing legal framework provided clarity on the roles of each actor (Agbodzakey, 2024). The socio-economic conditions of Lumajang community, most of which resided in disaster-prone areas and had a strong culture of cooperation, provided crucial capital for fostering active participation in the disaster management process. Environmental factors such as the mountainous geography and the potential for Mount Semeru eruption demanded a coordinated logistics strategy. Furthermore, limited resources and the experience of failed aid distribution in previous disasters made networking among actors increasingly necessary to ensure faster and more targeted aid distribution.

Leadership also played a crucial role in driving collaboration and strengthening logistics governance (Wanna, 2008). The firm leadership of the regional head and BPBD in integrating various parties provided clear direction for all actors. The participation of the village community, volunteers, and local organizational networks further strengthened cooperation due to interdependence in using limited resources. The experience of handling Mount Semeru eruption and flash floods in Lumajang also fostered a shared awareness that uncertainty in emergencies could only be overcome through cross-sector collaboration. This awareness motivated the local government, non-governmental organizations (NGOs), the business sector, and the local community to work more integratively in the disaster logistics process.

Principled Engagement

Emerson and Nabatchi (2015) divided principled engagement into four components that evolved through interactions between stakeholders to develop shared objectives and concepts to achieve collaborative outcomes (Emerson & Nabatchi, 2015b). These four components were summarized in Table 1.

Table 1. Principled Engagement Components

Component	Description
Discovery	Identification of shared values, issues, and interests that form the basis for building collaboration.
Definition	Deeper observation and analysis to develop concepts and terminology for shared use in addressing obstacles and opportunities.
Deliberation	Discussions that emphasize the quality of deliberation.
Determination	Establishing decisions, both procedural (agenda, working groups) and substantive (issue follow-up, forum recommendations), as agreed upon.

Source: Emerson and Nabatchi (2015)

In Lumajang Regency, principled engagement in disaster logistics management was evident through the involvement of multiple stakeholders in an open and structured forum. The local government, BPBD, TNI/Polri (Indonesian Armed Forces and Police), NGOs, volunteers, and village-based community groups jointly identified logistical needs, set aid distribution priorities, and allocated roles. This forum helped to avoid overlapping efforts and strengthened coordination across stakeholders. The process reflected the discovery and definition stages outlined by Emerson and Nabatchi (2015), as it enabled the development of shared understanding and established clear operational guidelines (Emerson & Nabatchi, 2015).

The next step included developing operational strategies such as selecting warehouse locations, defining distribution mechanisms, and training village volunteers. For instance, logistics warehouses were set up in Candipuro and Pronojiwo sub-districts which were areas close to Mount Semeru's high-risk zones to speed up aid distribution. BPBD, in collaboration with volunteers, also conducted distribution simulations and adopted a simple app-based tracking system to increase transparency in logistics flow. This stage represented the deliberation and determination components of principled engagement, as decisions were made through inclusive dialogue, thereby reinforcing community resilience.

Shared Motivation

Shared motivation was developed through deliberate efforts to foster mutual trust, understanding, and commitment among stakeholders involved in disaster logistics management. In Lumajang Regency, the BPBD played a central coordinating role, engaging actors across sectors—including village governments, TNI/Polri, NGOs, volunteer groups, private sector actors, and community-based organizations. Coordination meetings and post-disaster evaluation forums served as platforms for stakeholders to recognize one another's roles, correlate the objectives, and address potential conflicts of interest. This process correlated with Emerson & Nabatchi's (2015) concept of shared motivation, which includes mutual trust and mutual understanding (Emerson & Nabatchi, 2015). As actors grew to appreciate each other's capacities and limitations, stakeholders developed greater legitimacy in the decision-making process and increased buy-in. The components of shared motivation are detailed in Table 2.

Table 2. Shared Motivation Components

Component	Description
Mutual Trust	Mutual trust between parties is believed to reduce coordination costs, increase relationship stability, and encourage innovation.
Mutual	Understanding the interests, values, needs, and

Component	Description
Understanding	limitations of others, despite differences in positions or interests.
Internal Legitimacy	Trust that fosters acceptance and recognition of joint decisions.
Shared Commitment	A shared commitment to narrowing boundaries between sectors and organizations as well as working toward common goals.

Source: Colman (1998) and Emerson et al. (2015)

This shared motivation manifested in concrete commitments, such as the willingness of organizations to share logistical resources and reach consensus on prioritizing aid distribution for the most affected areas. For instance, volunteers and village officials assisted in distributing logistical aid with transportation support from TNI/Polri, while NGOs ensured the availability of accurate recipient data. This collaborative pattern helped to reduce coordination costs and significantly increased the speed of response, specifically during major disasters such as Mount Semeru eruption. This method not only improved the effectiveness of disaster response but also strengthened relationships among the actors.

Capacity for Joint Action

Capacity for joint action (CJA) referred to the collective capability developed by various stakeholders to integrate resources and expertise in disaster response. In Lumajang Regency which frequently experienced disasters such as Mount Semeru eruption, CJA played a crucial role in ensuring timely and accurate field responses. The local government, BPBD, volunteers, NGOs, village officials, and the private sector formed a coordination network in which each actor complemented the others. Emerson et al. (2012) (Emerson et al., 2012) outlined four key elements that form the basis for strengthening CJA, as shown in Table 3.

Table 3. CJA Elements

Element	Description
Procedural/Institutional Arrangement	Establishing clear basic rules, operational procedures, and organizational mechanisms to manage relationships between parties.
Leadership	Leadership that acts as an initiator, motivator, and external catalyst in building collaboration.
Knowledge	Knowledge and expertise that serve as social capital to integrate values and work ethics across actors.
Resources	Shared resources, such as funding, logistics, data, or other technical support.

Source: Emerson et al. (2012)

Strengthening organizational capacity and networks was a key strategy evident in field practice. Clear work mechanisms and procedures facilitated coordination, while strong leadership enabled rapid mobilization of volunteers and partners. Limited resources, such as TNI/Polri distribution fleets, logistics from NGO, and data on village aid recipients, were shared openly to avoid overlap. This pattern facilitated faster and more targeted aid distribution while building trust between actors.

The established CJA would strengthen local resilience, as each party not only mobilized during a crisis but also contributed to long-term preparedness. The relationships formed through routine coordination enabled a more structured response in preparation for future disasters, reduced reliance on a single party, and ensured a faster recovery. This correlated with the concept of Emerson and Nabatchi (2015) that CJA unites various

elements to build capacity useful for developing strategies and improving performance (Emerson & Nabatchi, 2015).

Discussion

Existing Model of Disaster Logistics Governance

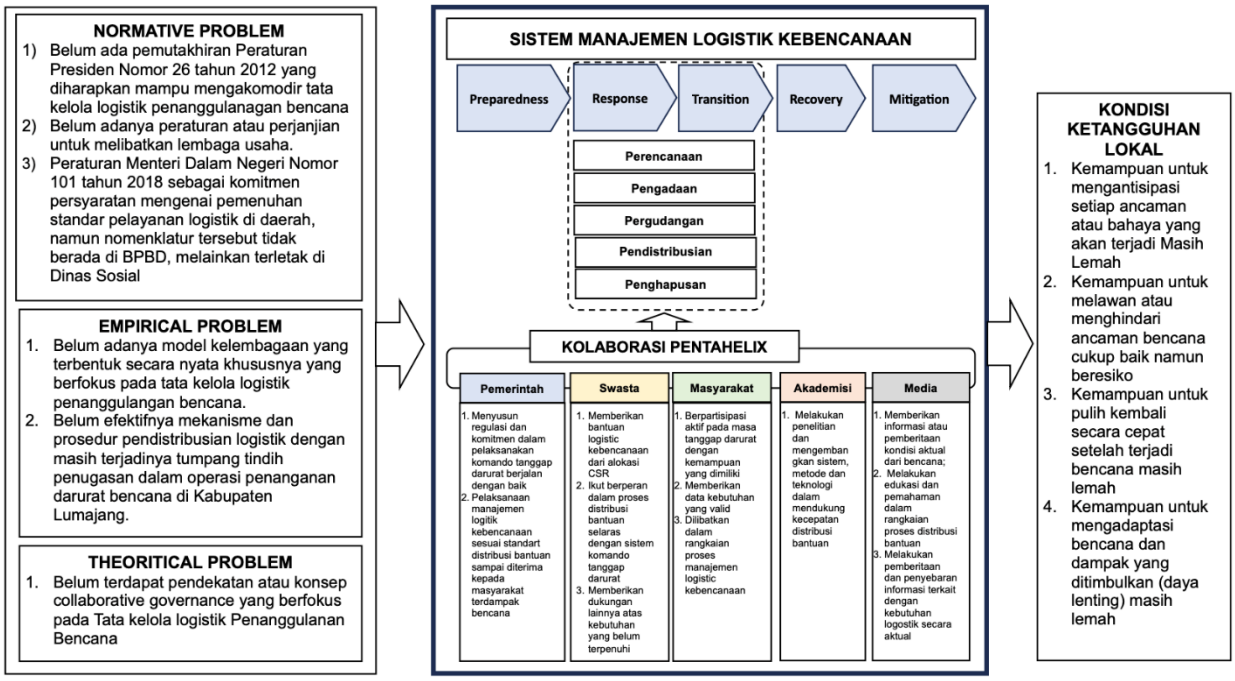

Figure 1. Existing Model of Logistics Governance in Lumajang Regency
Source: Author analysis

In Figure 1, the existing model of disaster logistics governance formulated in this study shows more systematic integration than previous models. In the Humanitarian Supply Chain model proposed by Howden (2009), the logistics flow is only mapped in general from procurement to distribution (Howden, 2009). The results broaden the scope by directly connecting each phase of the disaster cycle including preparedness, response, transition, recovery, mitigation, and a series of management processes. The method closely resembles the relief chain structure framework (Balcik et al., 2010), but places greater emphasis on different focuses and strategies for each phase (Balcik et al., 2010). This is important given that field results indicate that disaster logistics implementation in Lumajang Regency tends to follow a uniform administrative pattern across all phases, following BNPB regulations without distinguishing specific focuses and priorities.

Compared to Remida's (2015) sustainable humanitarian logistics model, which views the connection between logistics and sustainable development objectives, the model in this study places greater emphasis on the pentahelix collaboration aspect evident in the field (Remida, 2015). Collaboration between the government, the private sector, NGOs, communities, the media, and the local community serves as the central axis supporting each process. For example, in the preparedness phase, besides document development, village governments are motivated to allocate village funds to build the capacity of their residents.

In the response phase, rapid assessments, data validation, and distribution of logistical assistance are carried out in a coordinated manner, using cross-stakeholder resources to minimize the overlapping assistance that often occurs (Hariyono et al., 2025). This

model also addresses the weakness identified by Balcik et al. (2010) that the main challenge to post-disaster assistance is weak coordination between actors (Balcik et al., 2010).

The principle of separating focus per phase in this model also correlates with the practices of other countries with more mature disaster management practices. For example, FEMA in the United States differentiates response and recovery logistical needs, as fulfilling basic needs does not disrupt the rehabilitation process (Thomas & Kopczak, 2005). The results are relevant for Lumajang Regency, which is prone to major disasters such as Mount Semeru eruption, as shown in an interview with a leader at Lumajang Regency BPBD.

"After logistics items leave the warehouse, we then distribute them. This distribution differs from that during an emergency. In general, the need for logistics is the same in almost all locations. However, during the transition period, distribution is based on previously obtained data..." Anonymous informant (20/11/2024).

Interview data shows that logistics during the transition and recovery periods are often poorly planned because the items are absorbed during the emergency response period. A recent study indicates that local community capacity plays a crucial role in determining resilience. According to the community-based disaster risk reduction approach (UNDRR, 2019), efforts to strengthen disaster-resilient villages should be integrated into every phase of disaster management, not only during the pre-disaster period (Gan et al., 2021). For instance, engaging village volunteers in managing warehouses during emergencies has been shown to accelerate aid distribution while also enhancing residents' sense of ownership over the recovery process. In this context, establishing pentahelix collaboration not only optimizes limited resources but also ensures current preparedness.

The developed model fills a gap in the local disaster governance framework and further provides operational guidance that other regions in Indonesia can adopt. The main differences include an emphasis on actor roles, a focus on each phase of the disaster cycle, and a close connection to local community capacity building. Therefore, this model has the potential to enhance local resilience by promoting faster responses, a more organized recovery, and improved long-term adaptation.

Logistics Governance Formulation

Based on the results, a disaster logistics management method rooted in collaborative governance was developed by referencing the five phases of the disaster cycle. These include preparedness, response, transition, recovery, and mitigation. The existing model as shown in Figure 1, outlines the importance of coordinated participation of the five key sectors, including government, community, academics, business, and media, at each stage. This collaboration is considered a method to reduce coordination gaps, enhance local capacity, and speed up post-disaster recovery.

In preparedness phase, Pentahelix collaboration focuses on strengthening readiness before a disaster happens. The government leads by creating regulations and assessing logistical needs, while the community and village governments help identify local requirements. Academics contribute with risk studies and vulnerability assessments, the business sector assists through CSR (Corporate Social Responsibility) activities such as offering warehouses or transportation, and the media runs preparedness education campaigns. This method ensures that logistics stocks, distribution networks, and command systems are in place and ready to use when a disaster occurs, helping to prevent supply shortages.

During response phase, the focus is on meeting logistical needs quickly, accurately, and equitably. The government takes charge of the emergency response command

system. The community members and volunteers assist with on-the-ground distribution while the business sector strengthens distribution networks and resources. The academica also support data-driven distribution modeling with the media disseminating accurate information to minimize aid gaps. Strong collaboration at this stage accelerates aid delivery and reduces the risk of delays in logistics distribution, which often determines the safety of the affected community.

Collaboration aims to connect the emergency response period with medium-term recovery in the transition phase. The government needs to establish clear transition policies, including addressing the needs of the community in temporary housing, to ensure victims are not neglected when attention shifts from the emergency response. The community and NGOs help build temporary housing, academics support studies on safe locations and needs assessments, the business sector assists with providing temporary infrastructure, and the media spread information about the recovery process. Good coordination during this phase will speed up the path to a more permanent recovery.

In recovery phase, collaboration is directed at post-disaster social, economic, and infrastructure recovery. The government needs to prepare policies related to settlement planning or relocation, considering community safety. The business sector can play a role in supporting infrastructure reconstruction and local economic recovery. The community also plays a crucial role by providing psychological support and sharing skills to accelerate post-disaster economic recovery. Academics can strengthen Disaster Risk Reduction (PRB) capacity through thematic Community Service (KKN) programs and applied study activities. Meanwhile, the media plays a role in educating the public and conveying positive information to motivate disaster victims. Recovery process can proceed more quickly and sustainably with clear roles.

In mitigation phase, all elements of pentahelix work together to reduce the risk of future disasters. The government strengthens policies with Regional Regulations for Disaster Management (PB), Disaster Management Plans (RPB), and the designation of Disaster-Prone Areas (KRB) as the legal basis. Academics study potential new threats and develop methods for increasing community capacity. The business sector supports this effort through sustainable CSR and logistics innovation. The community participates in mitigation training and simulations, and the media disseminates information to raise public awareness. This will create a sustainable cycle that can build local resilience structurally and culturally.

Conclusions

In conclusion, this study was motivated by the high risk of disasters in Indonesia, specifically in Lumajang Regency, which remained part of the most vulnerable areas due to the location on the slopes of Mount Semeru. The main challenges included weak coordination among different actors in logistics management, asynchronous data, and the absence of an integrated information system, which often led to delayed and overlapping aid distribution. Although a legal framework for disaster management existed, its implementation at the regional level was limited to a uniform administrative method across all disaster phases, reducing the effectiveness of meeting victims' needs. This situation outlined the need for a more adaptive and collaborative logistics governance model to enhance local resilience.

The current logistics governance model identified in this study showed that implementation in Lumajang Regency was mostly centralized by the local government and BPBD, with no clear focus on separation by phase. This affected the transition and

recovery stages, which often went unnoticed because resources were dedicated to the emergency response phase. Although a cross-actor coordination forum existed, it was not fully operational or routine which led to overlapping aid distribution and delays. The pattern showed that without a clear separation of focus by phase and roles, local capacity in disaster logistics management could not be fully optimized.

The proposed model outlined pentahelix collaboration between government, community, academics, business, and media during each disaster phase namely preparedness, response, transition, recovery, and mitigation. The government oversaw the command and regulation system while the community actively assessed local needs. Furthermore, academics supported risk analysis and implemented thematic programs to strengthen PRB, and the business sector enhanced logistics networks through CSR. The media also played an educational and information-sharing role. By focusing on each phase and assigning specific roles, this model accelerated logistics distribution and reduced supply gaps, and enhanced the ability of the local community to respond to disasters sustainably.

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