



Talent-Based Disaster Management: A Case Study of Flood Disaster Handling in The Provinces of Aceh, North Sumatra, and West Sumatra

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Abstract

Background: Recurrent floods in Aceh, North Sumatra, and West Sumatra expose persistent weaknesses in matching disaster personnel competencies with operational needs and in coordinating personnel across institutions.

Objective: This study aims to formulate a proposed talent-based disaster management framework that explains the roles of talent management and collaborative governance across mitigation, preparedness, response, and recovery in Aceh, North Sumatra, and West Sumatra.

Methods: This exploratory qualitative multiple-case study examined documentary evidence and interviews with four informants (N1–N4) drawn from disaster-governance, operational, and academic stakeholder groups. Data were organized by disaster phase, coded deductively using talent-management and collaborative-governance concepts, compared across the three provincial cases, and synthesized through pattern matching.

Results: The findings identify recurring competency mismatches, fragmented personnel information, uneven access to certification, and weak retention arrangements. Cross-case synthesis links mitigation to talent identification, preparedness to development, response to competency-based deployment, and recovery to retention, with collaborative governance providing the coordination mechanism among government, emergency organizations, security institutions, communities, and other stakeholders.

Conclusion: The resulting proposed conceptual framework redirects attention from personnel volume alone to competency fit, shared personnel information, cross-agency standards, and sustained specialist participation. Because the framework is based on four informants and documentary evidence, it should be validated with larger comparative samples and different disaster types before claims of effectiveness are made.

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INTRODUCTION

Floods in Aceh, North Sumatra, and West Sumatra represent recurrent hydrometeorological risks whose consequences may cascade from extreme rainfall to landslides, infrastructure disruption, displacement, and interruption of basic services. Official BNPB material identifies these provinces as affected areas in the 2025 Sumatra emergency; however, the present study does not reproduce province-level event or population totals because the underlying

records were not sufficiently disaggregated for independent verification ([BNPB, 2025](#)). Huggins et al. ([2021](#)) is used only to explain the cascading-disaster concept, not as a source for Indonesian event counts.

From a disaster-management perspective, flooding must be addressed through the connected phases of mitigation, preparedness, response, and recovery ([Damon, 2002](#)). Effectiveness therefore concerns more than response speed: it also depends on preparedness, appropriate resource allocation, coherent field command, and continuity during recovery. Evidence reviewed in the three provinces indicates that these dimensions remain uneven and require a more integrated approach.

One fundamental issue is the readiness and competency fit of disaster personnel. Individuals with specific competencies must be assigned to roles that correspond to operational needs in each disaster phase. The study material indicates different manifestations of this problem across the cases: limited certified crisis-management and logistics expertise in Aceh, fragmented instructions and delayed decisions in North Sumatra, and an imbalance between active personnel and field-specialist needs in West Sumatra. These observations are treated as case evidence rather than generalized provincial statistics.

In this study, disaster talent refers to personnel whose verified competencies are critical to strategic or operational roles during one or more disaster phases. Talent management is distinguished from routine human-resource administration because it deliberately identifies critical roles, develops relevant competencies, deploys personnel according to verified expertise, and retains specialists for operational continuity. The analytical framework combines these functions with strategic human-resource planning Armstrong ([2014](#)) and later talent-management applications that emphasize adaptive organizational capacity ([Mahroof et al., 2025](#)).

Disaster-management effectiveness also depends on collaboration among central and local governments, BNPB/BPBD, the TNI, the National Police, emergency and health organizations, communities, private organizations, academics, and volunteers. Collaboration connects competency information to joint decisions: agencies must share personnel data, agree on command and task boundaries, and deploy resources through interoperable procedures. Without these mechanisms, a large workforce may still produce duplication, delayed assignment, or unmet specialist needs ([Geddam & Raj Kiran, 2024](#); [Guerrero et al., 2023](#)).

Although Indonesian disaster regulations distribute responsibilities among government and supporting institutions, the relevant research gap is operational rather than merely normative. The case material shows that formal mandates have not consistently produced integrated personnel information, synchronized assignments, or shared competency standards across sectors ([Government of the Republic of Indonesia, 2007](#)).

The central research gap lies in the limited integration of strategic talent-management functions with collaborative-governance mechanisms across the disaster cycle. Collaborative governance requires shared principles, mutual commitment, and capacity for joint action among participating institutions Emerson et al. ([2012](#)), while disaster-response research shows that inter-organizational performance depends on effective coordination and information exchange ([Guerrero et al., 2023](#)). Talent-management research, meanwhile, emphasizes the identification of critical roles, competency development, appropriate deployment, and retention of strategically important personnel ([Mahroof et al., 2025](#)). The evidence examined in Aceh, North Sumatra, and West Sumatra indicates that fragmented personnel information, uneven competency verification, deployment mismatches, and discontinuity in specialist involvement remain interconnected problems. Therefore, the gap addressed by this study is not simply a shortage of personnel or coordination mechanisms, but the absence of an integrated cross-agency framework that connects competency information with collaborative decisions throughout mitigation, preparedness, response, and recovery.

Accordingly, this study proposes a conceptual framework that integrates four disaster phases with four talent functions and collaborative governance. Its novelty lies in treating talent identification, development, deployment, and retention as phase-specific inter-organizational processes rather than as internal administrative tasks. The framework is a synthesis of qualitative evidence and established theory; it is not presented as an empirically validated causal model.

Based on the background of the problems mentioned above, this research is important to

strengthen the institutional design and management of disaster human resources that are more adaptive and integrated. Based on this description, the research questions that can be asked are: (1) what is the role of talent management and collaborative governance in increasing the effectiveness of flood disaster management in Aceh, North Sumatra, and West Sumatra?; and (2) how can a talent-based disaster management model be developed to strengthen synergy between *stakeholders* in disaster management in Indonesia?

METHOD

This study uses a case study approach as a qualitative research strategy. Case studies are an empirical research method that investigates contemporary phenomena in-depth in real-life contexts, especially when the boundaries between phenomena and contexts are not clearly visible and involve various sources of evidence. Meanwhile, Creswell (2018) explained that case studies are research approaches that explore in depth a bounded system, whether in the form of programs, events, activities, processes, or individuals, through the collection of detailed data from various sources of information over a certain period of time.

The three provinces were treated as bounded cases for within-case interpretation and cross-case comparison. Case-level comparisons relied primarily on documentary evidence specific to Aceh, North Sumatra, and West Sumatra, while the four interviews were used to interpret cross-cutting patterns in competency mapping, training and certification, deployment, retention, and inter-organizational coordination. Because a verifiable province-to-informant mapping was not available in the research record, interview statements were not attributed to individual provinces unless supported by corresponding documentary evidence. This analytical strategy limits statistical generalization but permits cautious analytical transferability to comparable disaster-governance settings. There are several research phenomena and symptoms observed in this study, as follows:

Table 1

Research Focus and Phenomenon

Research Focus	Research Phenomenon	Observed Symptoms
Implementation of human resource management and collaboration between stakeholders in disaster management in Aceh, North Sumatra, and West Sumatra Provinces	Mitigation	• Competency-based disaster human resource mapping in disaster-prone areas. • The description of mitigation training is still general based on the specific needs of the region. • Incentive planning for human resources involved in mitigation activities
	Preparedness	• The condition of personnel expertise with the needs during standby conditions. • Emergency technical training data (emergency response) that is adaptive to the type of disaster.
	Response	• Number of volunteers deployed in disaster management • The number of personnel who have specific competencies (medical, logistics, SAR). • Number of incentives and rewards for HR involved in

Recovery	mitigation activities • Identify human resources with rehabilitation and reconstruction expertise. • Training related to resilience-based redevelopment (build back better). • Placement of human resources for recovery in a sustainable manner in the affected areas. • Career schemes or long-term incentives for HR involved in the recovery phase.
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RESULTS AND DISCUSSION

Results

The following are the results of the discussion of the talent-based disaster management model adopted from the disaster management theory formulated by Damon (2002) and the stages of talent management implementation formulated by (Collings and Mellahi, 2009). The analysis and discussion were delivered in the following stages: a) Talent Mitigation and Mapping Stage; b) Talent Preparation and Development Stage; c) Response Stage and Talent Placement; d) Talent Recovery and Retention Stage. Based on these stages, a talent-based disaster management model has been prepared.

Analysis Results

Based on the results of the analysis at the time of disaster management starting from the handling stage to the completion of the disaster, namely: 1) mitigation associated with talent identification; 2) preparation associated with talent development; 3) responses associated with talent placement; and 4) recovery associated with talent retention, the following analysis was submitted:

Mitigation and Talent Mapping Stages

Cross-sector participation is an established component of disaster management, involving BPBD, local governments, security institutions, technical agencies, emergency organizations, and community-based actors. However, the available evidence does not provide a validated basis for estimating the ideal number of mitigation personnel in Sumatra or Aceh. The more defensible finding concerns information integration: personnel numbers, competencies, readiness, and distribution continue to be managed across separate institutional systems. Consequently, mitigation planning would benefit from an integrated cross-agency personnel registry that allows decision-makers to identify available competencies and deployment readiness without relying on unsupported staffing estimates (Government of the Republic of Indonesia, 2007).

However, the estimated need basically still focuses on the core human resources of BPBD as a leading sector, and has not explicitly included the contribution of human resources across sectors, such as the Indonesian National Army, the National Police of the Republic of Indonesia, and technical regional apparatus organizations (OPD). In fact, in practice, cross-sector involvement is an important part of disaster management in Indonesia as mandated in Law Number 24 of 2007 concerning Disaster Management. The involvement of the TNI in mitigation activities, such as infrastructure development and regional preparedness, has also been reported in various national news reports. In addition, the National Police also plays a role in educational activities and strengthening community preparedness. Weak coordination and leadership are often the main inhibiting factors, even though the effectiveness of mitigation is highly dependent on synergy between government and non-government agencies. The statement shows that cross-sector collaboration has actually taken place in practice, but has not been supported by an integrated HR data collection system. As a result, the contribution of personnel from the TNI, Polri, and OPD has not been comprehensively reflected in the planning of mitigation human resource

needs.

If the contribution of human resources across sectors is taken into account, then the number of actual personnel does increase nominally. In the Sumatra region, the number of mitigation human resources can increase from around ± 250 core BPBD personnel to ± 600 – 700 personnel after including elements of the TNI, Polri, and OPD. Similarly, in Aceh Province, the number of personnel can increase from ± 50 to ± 150 personnel. However, this figure is still far from the ideal need, which is $\pm 3,000$ personnel in Sumatra and ± 900 personnel in Aceh. This gap shows that despite cross-sectoral collaboration, the overall capacity of mitigation human resources is still inadequate to address the complexity of disaster risk in the region. Limited human resources and supporting infrastructure remain a crucial obstacle in minimizing risks in the field. This condition is also reflected in the high number of victims and the impact of disasters in Sumatra in recent years, as well as the high number of refugees which shows that mitigation efforts have not been optimal.

Therefore, in the future, strategic steps are needed in the form of data collection and integrated mapping of cross-sector mitigation human resources involving BNPB, the TNI, the National Police, and local governments. This data collection not only includes the number of personnel, but also their competence, readiness, and distribution. Without such an integrated database, disaster management planning will continue to experience a gap between real capacity and ideal needs. In addition, strengthening risk communication strategies and *ethical stakeholder engagement* are important foundations for building long-term resilience in the face of disaster uncertainty. With an integrated data collection system, the government can quickly identify and deploy the right personnel, so that cross-sector collaboration can run more effectively, structured, and responsive in supporting disaster mitigation efforts (Nurjanah et al., 2026).

Preparedness and Talent Development Stage

The preparedness stage in the disaster management system in Indonesia places human resource (HR) capacity development as a key component, especially through training, simulation, and competency certification. Within the BNPB policy framework, preparedness is directed to ensure that personnel have technical and managerial capabilities in dealing with potential disasters. Globally, UNDRR through the BNPB (2020b) *Sendai Framework for Disaster Risk Reduction 2015–2030* emphasizes that capacity-building of competency-based human resources is a top priority in disaster risk reduction. However, until now there is no national standard that explicitly sets the ratio of the need for certified human resources in the disaster system in Indonesia. In fact, effective preparedness requires an adaptive and proactive system in identifying infrastructure and manpower gaps before a crisis occurs. The urgency of mastering expert knowledge as the foundation of this professionalism is crucial, given that the obligation of a practitioner is to act within the limits of standardized knowledge and expertise to guarantee accountability for actions. Therefore, strengthening competency standards is not just a technical need, but a form of professional responsibility in minimizing the risk of handling failures in the field (Morris et al., 2025; Segon et al., 2024; WHO, 2015).

The documentary record confirms the availability of disaster training and certification mechanisms, but it does not support reliable population percentages for trained or certified personnel. Those percentages have therefore been removed. Interview evidence indicates that basic training is more widely accessible than formal competency certification, while quotas, budgets, personnel rotation, and differing agency standards constrain certification coverage (N3). The result is interpreted as a qualitative gap between participation in training and verified cross-agency competency, not as a population estimate (BNPB, 2022).

"Most of our personnel have indeed participated in basic disaster training. However, when it comes to competency certification according to national standards, the number is still limited. The obstacle is not only the budget, but also the certification training quota that has not been able to accommodate all personnel. As a result, when there is a turnover of employees or new assignments, there are still many personnel who work based on experience rather than competency certification." (N3). The statement shows that human resource capacity development at the preparedness stage is still dominated by general training, while competency certification has not yet become a systematic part of disaster human resource management. This condition has the potential to cause

variations in the ability of personnel to carry out their duties according to operational standards.

In the future, the need for training lies not only in increasing the number of participants, but also in strengthening the quality and more specific types of competencies. The training required includes disaster risk analysis skills, the implementation of *the Incident Command System* (ICS), the management of early warning systems, as well as community-based approaches such as *Community-Based Disaster Risk Reduction* (CBDRR). In addition, talent development needs to be directed towards specialist competencies, such as GIS-based mapping, disaster logistics management, as well as mastery of effective risk communication strategies to build stakeholder engagement in vulnerable destinations. Without a nationally standardized training curriculum and integrated with a certification system, human resource capacity building has the potential to be suboptimal in supporting disaster preparedness (ISC, 2025; Nurjanah et al., 2026).

In practice in the field, the composition of personnel who are demoted in the event of a disaster indicates that most do not have formal certification. The personnel involved generally come from BPBD, the Indonesian National Army, the National Police of the Republic of Indonesia, and volunteers, with an estimated only about 10–20% having disaster competency certifications, while the rest rely on experience and non-formal training. This inequality impacts the effectiveness of coordination and operational standards in the field, where variations in personnel capabilities can affect the quality of disaster response. This shows that the disaster management system in Indonesia still tends to be BNPB (2022) *experience-based* rather than *competency-based*. *"In disaster management operations, we often work with BPBD, the National Police, volunteers, and other agencies. Personnel experience is indeed very helpful, but when each agency has different training standards, coordination in the field does not always run uniformly. In our opinion, it will be much more effective if all personnel have the same competency and certification standards so that communication, division of tasks, and decision-making can be done faster."* (N3). The findings show that the problem of preparedness is not only related to the number of personnel, but also the uniformity of competencies between organizations. Thus, strengthening the cross-sector certification system is an important prerequisite in realizing integrated disaster talent management. In addition, low readiness at the household level often aggravates the workload of field personnel whose competencies have not been standardized (Inyang-Ogim et al., 2026).

Thus, it can be concluded that there is a significant gap between the need and availability of trained and certified human resources in the disaster preparedness stage. If it is assumed that the need for national disaster human resources reaches tens of thousands of personnel, then with the certification level still in the range of 10-20%, there is a considerable competency gap in the disaster preparedness system. Therefore, reforms are needed in the form of strengthening disaster talent management, including standardization of training, certification obligations, and the development of a national database of human resource competencies. This is crucial to ensure that each personnel has adequate competencies, including special abilities in dealing with vulnerable groups and children with special needs that are often overlooked in emergency response. Increasing the capacity of personnel also needs to pay attention to the population of an area so that there is a balance between the competencies possessed and the real needs in the field (Vivek et al., 2026).

Response Stage and Talent Placement

The response phase demonstrates substantial cross-sector mobilization involving the TNI, the National Police, BPBD, health workers, search-and-rescue personnel, and volunteers. Official emergency information reported more than 46,000 TNI and police personnel mobilized during the December 2025 Sumatra response (Presidential Press Release, 2025). This figure demonstrates mobilization capacity, but the evidence does not support a numerical estimate of total personnel required. The analytical issue is therefore competency composition and placement, particularly for medical, logistics, communications, engineering, and incident-command functions.

Overall, this response scale shows great capacity, but its effectiveness relies heavily on the system's ability to gradually integrate field information to produce accurate impact estimates for decision-making. On the other hand, this massive mobilization requires a paradigm shift in meritocracy, from previously only focusing on maximum production or Yoshimori (2026) *output*

(*meritocracy of production*), to a model that emphasizes more on efforts to preserve and sustain resources in the face of socio-ecological crises. Thus, the success of the response is not only measured by the number of personnel deployed, but also by the efficiency of utilizing existing talent to minimize the impact of further damage (Verger et al., 2025). *During emergency response, our challenge is no longer how to increase the number of personnel, but how to ensure that the personnel sent are really in accordance with the required competencies. In some cases, the number of personnel is sufficient, but the distribution of medical, logistics, communication, and technical personnel has not been fully balanced with the needs in the affected locations.*" (N1). The statement shows that the effectiveness of the response is not only determined by the amount of personnel mobilization, but also by the accuracy of the placement of talents according to operational needs in the field.

However, to assess whether the amount is in accordance with real needs, a quantitative approach based on operational standards is needed. In an *Incident Command System (ICS)-based disaster management system*, the span of control principle states that one supervisor can effectively only manage 3–7 personnel (optimal 5 people). The need for personnel in large operations will increase exponentially with the complexity of the region, but it is necessary to realize that this layered command structure is also susceptible to cognitive overload and psychological stress that can degrade managerial performance in the field. In addition, in the guidelines for handling disaster health crises in Indonesia, the minimum need for health workers for 10,000 refugees alone reaches dozens of core personnel (doctors, nurses, sanitarians, etc.), which shows that the need for human resources increases with the scale of the affected population (FEMA, 2023; Samman et al., 2026).

Interview and documentary evidence indicates that participation in basic disaster training is more widely available than formal competency certification. Certification coverage is constrained by training quotas, budget availability, personnel rotation, and differences in institutional standards (N3). Because the available evidence does not support a reliable population-level certification percentage, the finding should be interpreted qualitatively rather than numerically. The main preparedness challenge is therefore the uneven verification of competencies across agencies, indicating a need for interoperable competency standards, structured specialist development, and a shared certification record that can support cross-agency deployment.

Although quantitatively the number of personnel deployed ($\pm 46,000$) is relatively close to the real need, the main problem lies in talent deployment. Data shows that most of the personnel come from general elements such as the TNI and the National Police, while the need for specialist personnel is not met proportionally. For example, in Aceh Province, more than 1,500 health workers are needed, consisting of 709 hospital workers and 845 workers for health centers and evacuation centers, but there is still a shortage in the field (Ministry of Health, 2025). This shows that there is a mismatch between the types of talents available and specific needs (skill mismatch). *"In some emergency operations, we often receive large amounts of personnel assistance. However, when mapping needs is carried out in the field, there is still a shortage of personnel with certain competencies, such as logistics experts, health workers, heavy equipment operators, and personnel who understand the incident command system. This condition causes the redistribution of personnel to be carried out during the operation.*" (N1). The findings show that the main problem at the response stage is not simply a shortage of personnel, but a mismatch between the competencies of available personnel and the specific needs of the disaster site. This mismatch becomes especially risky when dealing with *cascading disasters* where the failure of one infrastructure system can trigger systemic impacts that require highly technical specialized expertise (Huggins et al., 2021).

In addition, when compared to the target of national disaster-certified human resources of only around 1,084 people until 2029, the proportion of certified professionals in these operations is estimated to be only around 2–3% of the total personnel. This condition confirms that Indonesia's response system is still dominated by a mass deployment (number-based) approach, not competency-based deployment (expertise-based). (BNPB, 2025b) *Mobilizing large numbers of personnel is indeed important to accelerate the initial handling. However, based on our experience, the success of operations is highly dependent on the placement of competent personnel*

according to the needs of the field. Personnel who understand search and rescue, logistics, communications, health, and field engineering cannot simply replace each other. Therefore, a cross-agency competency database is a very urgent need." (N2). The statement corroborates that the transformation towards *competency-based deployment* requires an HR information system that is able to map the competencies of personnel across sectors in real time so that the talent placement process can be carried out quickly, precisely, and accountably. In other words, even though the number of personnel in aggregate is close to real needs, its effectiveness is not optimal because it is not supported by the right distribution of talent.

Based on the results of the above analysis, it can be concluded that the disaster management response stage in Indonesia has shown a large mobilization capacity and is relatively close to real needs quantitatively. However, qualitatively, there is still a significant gap in talent placement, especially related to the shortage of specialist personnel and the low proportion of certified human resources. Therefore, the transformation of the talent placement system to be competency-based, through strengthening the national human resource database and cross-sectoral integration, is the key to increasing the effectiveness of disaster management in the future.

Recovery and Talent Retention Stage

During recovery, effectiveness depends on sustaining specialist participation in rehabilitation, restoration of services, and reconstruction. The relevant talent-management problem is continuity: health workers, teachers, engineers, and social workers may return to their home institutions when long-term assignments, professional support, and differentiated recognition are absent. This study therefore examines retention mechanisms without relying on media reports about a daily incentive amount and without using technically unrelated studies of cloud disaster recovery or earthquake-waste facilities.

The challenge of talent retention is increasingly seen in civilian professions such as health workers and teachers. *"So far, the post-disaster assignment policy is still more oriented towards resolving emergency conditions. Even though the recovery phase requires experts who last for a longer time. Therefore, in the future, a talent management system is needed that not only regulates personnel mobilization, but also provides career development pathways, awards, and different incentives according to competencies and job risk levels."* (N1). The statement emphasized that the success of the recovery phase is greatly influenced by talent retention policies that are able to maintain the sustainability of professional involvement. Therefore, the reward system needs to shift from a uniform approach (*flat incentive*) to *competency-based talent retention* that rewards them according to competencies, certifications, contributions, and job risk levels.

Based on the guidelines of the Ministry of Health of the Republic of Indonesia, the need for health workers in the recovery phase is very high and sustainable, including curative, preventive, and mental health services for refugees. However, in the field there is still a shortage of health workers which shows that there is a gap between the need and availability of human resources. On the other hand, teachers have an important role in restoring the psychosocial conditions of children affected by disasters, especially in maintaining the sustainability of education. However, there is no adequate reward scheme for educators in the affected areas, so their contribution has not been balanced with proportionate support ([Dwiningtias & Khairul Rahmat, 2025](#); [Indonesian Public Health, 2026](#); [Ministry of Health, 2025](#)).

Therefore, strengthening talent retention in the recovery stage must be carried out through a more comprehensive approach. Financial incentives remain important, but they need to be developed into a competency-based incentive system that considers expertise, certification, and the level of work risk ([BNPB, 2024](#)). In addition, non-financial awards such as job safety guarantees, professional recognition, career development opportunities, and psychosocial support are also key factors in retaining talent (Sphere Association, 2018). Without this transformation, Indonesia will continue to face limitations in retaining disaster professionals in the long term (BNPB, 2024). Thus, talent retention must be positioned as the main pillar in disaster recovery policies, not just a complement to the human resource mobilization system as directed by the National Disaster Management Agency ([BNPB, 2024](#)).

Talent-Based Disaster Management Model

The proposed talent-based disaster management framework integrates the disaster cycle with talent identification, development, competency-based deployment, and retention. It is grounded in recurring qualitative patterns concerning fragmented personnel information, uneven competency verification, deployment mismatch, and discontinuity during recovery. Because the framework has not been tested through a larger comparative or quantitative design, it is presented as an analytically derived proposal that requires further validation rather than as a model proven to resolve the empirical gap.



Figure 1. Talent-Based Disaster Management Model

Mitigation Stage: Talent Analysis and Mapping

At the mitigation stage, this model emphasizes the importance of systematically mapping the needs and availability of disaster talent. Based on the results of the research, HR planning has so far been traditional and *activity-based*, so it often ignores the potential of advanced technology and stakeholder collaboration in building innovative HR strategies. This traditional approach makes it difficult for organizations to build innovation networks that are adaptive to environmental changes. The results of the study also show that until now there is no integrated database of disaster talents between agencies, so the process of identifying and mobilizing personnel is still partially carried out based on the availability of personnel in each organization. " (Jimoh et al., 2025) *So far, each agency actually has its own personnel data, but there is no single database that can describe the competence of disaster human resources nationally. When a disaster strikes, we still have to coordinate to find out who has certain skills, where those personnel are, and whether they are ready to be deployed. This condition causes the talent mobilization process to not be completely competency-based, but more based on the availability of personnel in each agency.*" (N1). Therefore, this model proposes a transformation towards more open and comprehensive talent management through three main components: 1) Estimated personnel needs based on planning documents (RIPB/RPB): Used as a baseline for disaster human resource needs nationally and regionally. 2) Talent inventory across sectors: including the TNI, Polri, BPBD, OPD, health workers, volunteers, and the community, so as to reflect a *whole-of-government* and *whole-of-society approach*. 3) Competency-based talent mapping and distribution: At the heart of this stage is identifying who has what competencies, where they are, and are ready to use in a given disaster scenario.

This stage answers the empirical gap in the form of inequality in the number and distribution of human resources, as well as the lack of an integrated disaster talent database. The importance of competency-based mapping and transparent recruitment is in line with research showing that merit-based recruitment systems and the existence of clear professional advancement opportunities are crucial factors in shaping positive behaviour and employee integrity in the public sector. With strong database integration, this model ensures that the

deployment of personnel not only meets the quantity, but also the quality of professionalism required in emergency situations (Hennessy et al., 2025).

Preparation Stage: Talent Development and Certification

The preparatory stage in this model is focused on improving the quality of talent through a standardized competency development system. The findings of the study show that most disaster human resources are still *experience-based*, not *competency-based*. This is in line with the urgency of implementing a data-algorithm-based talent management model that is able to increase system operational efficiency by up to 48.26% through a more accurate classification of basic personnel information (Hao, 2025). *Most of our personnel have indeed participated in basic disaster training. However, the number of personnel who have competency certification according to national standards is still limited. In the implementation of duties, field experience is often the main reference because not all personnel have had the opportunity to take part in certification. As a result, the quality of competence among personnel is still uneven.*" (N4). The results of the interviews show that disaster human resource capacity development is still oriented towards increasing the number of trainees, while the certification mechanism and competency management have not yet become an integrated part of the talent management system. This condition causes organizations to not have comprehensive information about the competence, certification, or readiness of each personnel to be assigned to certain types of disasters. Based on these findings, this model develops three main instruments, namely:

- 1) Disaster talent certification: Carried out through national competency standards (e.g. BNSP, BNPB, Basarnas), so that each personnel has measurable qualifications.
- 2) Development of a national talent database: Contains information on certified and uncertified personnel, including skill types and readiness levels.
- 3) Specific competency development: including ICS (Incident Command System), GIS, disaster logistics, crisis communication, and community-based approaches (CBDRR).

This stage aims to overcome the *gap* in the form of a low proportion of certified human resources ($\pm 10\text{--}20\%$), as well as the absence of a nationally integrated training system. The urgency of this standardization is in line with the need for a hybrid model between competence and meritocracy that emphasizes the mastery of comprehensive knowledge, managerial skills, and intellectual and emotional intelligence as the foundation for effective leadership selection. With the implementation of strict standards, talent development is no longer only oriented towards participation in training, but on the achievement of competency indicators that are able to improve the overall efficiency of the system (Dargahi et al., 2025).

Response Stage: Competency-Based Talent Placement

The response stage is the operational core of the model, where the talent that has been mapped and developed is then placed appropriately according to the needs of the field. The results show that although Indonesia is able to mobilize large numbers of personnel during emergency response, the effectiveness of disaster management still faces obstacles in the form of mismatches between the competencies of available personnel and specific needs in the field (*skill mismatch*). This condition causes the personnel placement process to not fully implement the *competency-based deployment principle*. *"In several emergency response operations, the number of personnel deployed is actually sufficient. However, the biggest challenge is no longer the number of personnel, but how to ensure that the personnel sent have the competencies as needed in the affected locations. Not all personnel have the same capabilities, so deployments often have to be readjusted after the operation has taken place."* (N4). The findings show that the effectiveness of the response stage is greatly influenced by the organization's ability to place talent according to competencies, not solely based on the availability of personnel. Therefore, this model puts *talent deployment* at the heart of the disaster response process. Based on these findings, the Model emphasizes three key aspects: 1) Mobilization of talent across sectors: involving the TNI, Polri, BPBD, health workers, and volunteers on a large scale. 2) Utilization of digital systems (ICS-based applications/IT): To support real-time command, coordination, and distribution of personnel. 3) Talent specialization: Placements based on expertise, such as medical, SAR, logistics, evacuation, and command.

The findings of the study show that despite the large number of personnel (*mass*

deployment), there is still a *skill mismatch*, which is a mismatch between competence and field needs. This is reinforced by the view that digital transformation in talent management often faces obstacles in the form of resistance to change, which requires transformational leadership to ensure the effectiveness of personnel placement. In addition, the challenge in shifting the paradigm from mere numbers to the accuracy of competencies is also influenced by the culture of primordialism and patronage that still overshadows the implementation of the merit system in the bureaucracy. Therefore, this model shifts the paradigm not only in terms of the number of personnel but also the accuracy of personnel competencies (Mahroof et al., 2025; Malik & Prasajo, 2023).

Recovery Stage: Talent Retention and Evaluation

The recovery stage in this model emphasizes that success is not only determined by the initial response, but by the ability to retain talent in the long term. The results show that the involvement of professionals in the rehabilitation and reconstruction phases tends to decrease as the emergency response period ends. This condition is influenced by the suboptimal award system, the limitations of the long-term assignment mechanism, and the unavailability of career development pathways for disaster human resources. *"During emergency response, personnel support from various agencies is relatively easy to obtain. However, when entering the rehabilitation and reconstruction stage, retaining professionals is a challenge in itself. Many personnel have to return to carry out their duties in their home agencies because there is no long-term assignment mechanism or reward system that can encourage them to continue serving in the affected areas."* (N1). The findings show that the main challenge in the recovery phase is no longer personnel mobilization, but the sustainability of professional engagement. Therefore, this model places *talent retention* as the main strategy to maintain the continuity of the post-disaster rehabilitation and reconstruction process. Based on the results of the study, the main components of this stage include:

- 1) Talent retention: Retaining professionals (health workers, teachers, engineers, etc.) in the rehabilitation and reconstruction process.
- 2) Competency-based reward system: Incentives are no longer flat, but consider expertise, risk, and contribution.
- 3) Talent monitoring and evaluation (money): To update the HR database and improve the quality of the system on an ongoing basis.

This stage answers empirical problems in the form of: weak incentive systems, unsustainable human resource involvement, and no *career path* in the field of disasters. The importance of talent retention is in line with research showing that effective talent management strategies are crucial in retaining professionals, such as nurses, to increase productivity and affective commitment in a stressful work environment. In addition, the implementation of a merit and professionalism system supported by the right reward system has been proven to significantly improve the sustainable performance of employees through Gül & Sönmez (2025) *value co-creation* in the organization. Therefore, strengthening this recovery phase is the key to the sustainability of disaster management capacity in the future (Syahraini et al., 2025).

Discussion

The cross-case pattern is best explained by an institutional coordination problem rather than by personnel scarcity alone. Agencies hold different mandates, training systems, and personnel records, so competency information is not consistently available at the point of joint deployment. This explains why large mobilizations can coexist with specialist shortages or reassignment during operations. The finding extends collaborative-governance theory by identifying shared competency information as a specific component of capacity for joint action and extends talent management by locating identification, development, deployment, and retention across organizational boundaries rather than within a single employer (Guerrero et al., 2023).

At the mitigation and preparedness stages, the findings indicate that the principal challenge lies in the limited integration between workforce planning, competency mapping, training, and certification. Existing planning practices remain closely associated with

organizational programs and activities, whereas disaster operations require information about what competencies are available, where personnel are located, and whether they are sufficiently prepared for particular hazards. This condition is consistent with the strategic talent management perspective of Collings (2009), which emphasizes the identification of strategically important positions and the development of talent pools capable of filling those positions. In disaster governance, however, such talent pools cannot be confined to a single organization because operational capacity is distributed among BPBD, BNPB, the TNI, the National Police, health services, search-and-rescue institutions, local governments, volunteers, and other stakeholders. The preparedness findings further demonstrate that participation in training does not automatically indicate verified competency. Differences in certification opportunities, institutional training standards, personnel rotation, and organizational responsibilities can create variations in operational capability. Consequently, disaster preparedness requires not merely a greater number of training activities but a cross-agency system that links competency standards, certification records, personnel readiness, and disaster-specific requirements. This interpretation expands strategic human-resource management principles Armstrong (2014) into an inter-organizational disaster context in which competency development must support collective rather than exclusively organizational preparedness.

At the response stage, the findings demonstrate an important distinction between mobilization capacity and competency-based deployment. The involvement of large numbers of personnel from multiple institutions illustrates Indonesia's ability to mobilize organizational resources during emergencies, but the interview evidence indicates that specialist requirements may remain unevenly fulfilled. The problem therefore cannot be interpreted solely in terms of the total number of personnel deployed. Medical personnel, logistics specialists, search-and-rescue teams, communication personnel, engineers, and incident-command personnel perform different operational functions and cannot automatically substitute for one another. This finding provides a more specific human-resource interpretation of disaster-response effectiveness: personnel availability produces operational value only when competencies are matched to task requirements. It also supports the collaborative-governance perspective of Emerson et al. (2012), particularly the concept of capacity for joint action, because competency-based deployment requires participating institutions to exchange personnel information, establish compatible task classifications, clarify command relationships, and make joint deployment decisions. Thus, the proposed framework shifts attention from mass deployment toward coordinated deployment based on verified expertise. This does not mean that the present study proves that competency-based deployment improves disaster outcomes; rather, the qualitative evidence indicates that competency fit is a plausible mechanism that should subsequently be tested using measurable operational indicators.

The recovery findings add another dimension to disaster human-resource management by showing that the challenge changes after the emergency phase. During response operations, personnel can be mobilized through temporary institutional assignments, whereas rehabilitation and reconstruction require specialist involvement over a longer period. Health professionals, engineers, educators, social workers, and other specialists may have responsibilities in their originating institutions, making sustained participation difficult when long-term assignment mechanisms, professional recognition, career support, and differentiated retention arrangements are limited. Talent retention therefore becomes relevant not simply as an employee-management practice but as a mechanism for maintaining institutional continuity during recovery. This finding extends conventional talent-management theory because retention in disaster governance involves personnel who may belong to different organizations rather than employees of one institution. Accordingly, retention mechanisms need to be coordinated across institutional boundaries and may include professional support, recognition of competence and occupational risk, career-development opportunities, psychosocial support, and clearly defined periods of assignment. The proposed framework therefore connects recovery with talent retention while positioning collaborative governance as the mechanism through which participating institutions negotiate and sustain specialist involvement. In this sense, successful recovery depends not only on physical reconstruction and restoration of services but also on maintaining access to the professional capabilities needed throughout the recovery process.

Taken together, these findings support the proposed Talent-Based Disaster Management framework as an analytical integration of the disaster-management cycle, strategic talent management, and collaborative governance. Its theoretical contribution lies in treating talent identification, development, deployment, and retention as inter-organizational functions that correspond respectively with mitigation, preparedness, response, and recovery. Its practical implication is the need for an interoperable disaster-talent registry containing competency, certification, location, availability, and deployment-readiness information; compatible competency standards across participating institutions; scenario-based deployment procedures; and retention arrangements for specialists required during long-term recovery. Nevertheless, these implications must be interpreted cautiously. The framework was developed from a small purposive sample of four informants and heterogeneous documentary evidence across three provincial cases, while a verifiable mapping between individual informants and specific provincial institutions was not available in the research record. The study also did not measure whether the proposed framework improves disaster outcomes. Accordingly, the model should be regarded as a proposed conceptual framework rather than a validated causal model. Future studies should test it using larger and more transparent multi-provincial samples, different types of disasters, and measurable indicators such as deployment time, competency-task fit, inter-agency coordination quality, continuity of essential services, specialist retention, and recovery duration.

CONCLUSION

The findings indicate that talent management and collaborative governance perform complementary roles in flood disaster management. Talent management provides the mechanisms for identifying critical competencies, developing personnel, matching verified expertise with operational assignments, and maintaining specialist participation during recovery. Collaborative governance provides the inter-organizational mechanism through which personnel information can be shared, responsibilities coordinated, and deployment decisions aligned across government agencies, emergency organizations, security institutions, communities, and other stakeholders. The evidence from the three provincial cases therefore suggests that the central challenge is not personnel quantity alone, but the integration of competency information and coordination across institutional boundaries.

The study develops a proposed framework by aligning mitigation with talent identification, preparedness with talent development, response with competency-based deployment, and recovery with talent retention, while collaborative governance connects all four stages. In practice, the framework can be piloted through an interoperable talent registry, cross-agency competency standards, scenario-based deployment procedures, and retention arrangements for recovery specialists. However, the framework is limited by four purposively selected informants, incomplete code-to-affiliation information, heterogeneous documentary evidence, and the absence of outcome-based validation. Future research should therefore test the framework using larger and more transparent provincial samples, different disaster types, and measurable indicators of deployment, coordination, service continuity, and recovery performance.

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AUTHOR CONTRIBUTION STATEMENT

Pandu Wibowo contributed to the conceptualization, research design, data collection, data analysis, and preparation of the original manuscript. Kismartini contributed to conceptual development, methodological guidance, supervision, and critical revision of the manuscript. Teguh Yuwono contributed to theoretical development, interpretation of the findings, supervision, and manuscript refinement. Nadhia Elsa Silviani contributed to data organization, analysis, literature support, and manuscript preparation. All authors contributed to the finalization of the manuscript and approved the final version for publication.

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