

Penta Helix Collaboration Model Involving Reserve Component Personnel in Disaster Resilience in Malang Regency**D. Muktiyanto[†], S. Widagdo, M. Istiqomah and R. Parmawati**

Department of Doctoral Program in Resilience Studies, Postgraduate School, Brawijaya University, Malang, Indonesia

[†]Corresponding author: D. Muktiyanto; didikmuktiyanto@student.ub.ac.id

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ABSTRACT

This study aims to analyze the Penta helix collaboration model for involving reserve component personnel in disaster resilience in Malang Regency. A qualitative approach was used with an in-depth interview method involving nine informants from various Penta helix actors, namely academia, business, the community, government, and the Media. The main findings indicate that the Penta helix collaboration model has the potential to enhance disaster resilience in Malang Regency. Its strengths lie in inclusive participation, transparency, clear leadership, and the commitment of stakeholders. However, there are still weaknesses, such as a lack of coordination, limited resources, and suboptimal role understanding that hinder the involvement of reserve component personnel. Each actor makes significant contributions: academics provide knowledge, businesses aid in logistics, communities engage in mitigation and emergency response, the government formulates policies, and the media disseminates information. Major challenges include a lack of coordination, limited resources, miscoordination, bureaucracy, insufficient training, and unclear legal frameworks. Improvement efforts include strengthening coordination, increasing resource capacity, clarifying roles, developing guidelines, and enhancing training. In conclusion, the Penta helix collaboration model in Malang Regency has great potential but requires improvements to enhance its effectiveness, providing insights for stakeholders to strengthen disaster resilience in the region.

INTRODUCTION

Indonesia is an archipelagic country with a total area of 5,193,250 square kilometers, covering both land and sea (Rahayu et al. 2024). The land area of Indonesia spans 1,919,440 square kilometers and consists of 17,508 islands (Anggadwita et al. 2015, Riwanto 2017), with a coastline stretching 3,977 miles and a vast ocean area of approximately 3,273,810 square kilometers (Kusumajanti et al. 2020). Indonesia holds a strategic position in the Asian region. Geographically, the Indonesian archipelago is dominated by tropical rainforests and lies at the convergence of three tectonic plates: the Indo-Australian Plate to the south, the Eurasian Plate to the west, and the Pacific Plate to the east. The boundaries between these plates form a series of volcanic mountain chains surrounding the Pacific Ocean known as the Pacific Ring of Fire (Wibowo & Sembri 2016), resulting in 127 active volcanic mountains across the country, making it one of the most volcanically active regions in the world (Hamna et al. 2024).

In addition to its captivating natural wealth, Indonesia is also known as one of the countries vulnerable to serious natural disasters, which can threaten the lives of its population (Wesnawa & Christiawan 2014). Recognizing this, since the Brundtland report was published in 1987, disaster risk reduction (DRR) has been acknowledged as a key strategy for achieving sustainable development (Imperiale & Vanclay 2021). DRR aims to minimize the negative impacts of natural disasters, thereby protecting the lives and property of communities (Imperiale & Vanclay 2024). By integrating DRR into development plans and collaborating to build community

resilience, Indonesia can move towards a safer and more sustainable future. These efforts will not only protect lives and property but also support inclusive economic and social development.

One of the most frequent actual threats in Indonesia is the threat of disasters. Indonesia has a very high vulnerability to various disasters, such as earthquakes, tsunamis, floods, landslides, tornadoes, disease outbreaks, droughts, and volcanic eruptions (Alfajri et al. 2019). According to data from the National Disaster Management Agency (BNPB) on June 12, 2024, there were 891 disaster events in Indonesia throughout the year 2024, with 98.77% of them being hydrometeorological disasters and 1.23% being geological disasters (BNPB 2024). This reflects Indonesia's vulnerability to various types of natural disasters and highlights the importance of mitigation measures to reduce the impact of disasters in the future.

In the context of Malang Regency, East Java, it is classified as high risk in the national disaster risk class based on the 2021 National Disaster Vulnerability Index (IRBN) released by the National Disaster Management Agency (BNPB) with a score of 146.98 (BNPB 2021). The Malang Regency Regional Disaster Management Agency (BPBD) has extended the Emergency Response Alert Status for Hydrometeorological Disasters until the end of April 2024 and has mapped disaster-prone areas. The Head of the Emergency and Logistics Division of BPBD stated that this mapping is based on disaster risk assessments and previous incident data. Areas prone to strong winds include Karangploso, Dau, Singosari, Lawang, Pakis, Jabung, Tajinan, Poncokusumo, Bululawang, Gondanglegi, Sumberpucung, and Kepanjen. For landslides, vulnerable areas include Pujon, Ngantang, Kasembon, Karangploso, Dau, Singosari, Lawang, Poncokusumo, Tumpang, Ampelgading, Tirtoyudo, Dampit, Sumbermanjing Wetan, Wagir, Kromengan, Ngajum, and Wonosari. Flood-prone areas include Pujon, Ngantang, Kasembon, Karangploso, Dau, Singosari, Lawang, Pakis, Poncokusumo, Ampelgading, Tirtoyudo, Dampit, Sumbermanjing Wetan, Gedangan, Kalipare, and Wagir (Syamsuddin 2024). This indicates significant disaster risk potential in these areas, necessitating strategic measures to mitigate their impact.

Disaster resilience efforts in Malang also involve the local community, as proposed by Sudarmanto et al. (2020). This community played a significant role during the eruption of Mount Kelud by mobilizing, preparing, and evacuating people in Disaster-Prone Areas (DPA). Additionally, Rozikin et al. (2023) proposed the Family Disaster Resilience Program (Keluarga Tangguh Bencana - Katana). Therefore, reserve components should be involved in disaster management, especially in Pentahelix collaborations, to enhance the effectiveness and evaluation of disaster resilience in Malang.

Disaster resilience is a concept that has recently been used in disaster discussions worldwide. With the increasing frequency and intensity of disasters globally, disaster resilience has pressed for the expansion of efforts to reduce disasters by building disaster resilience at the global, national, and local levels. The UN General Guidelines on Assisting Building Resilient Communities (2020) emphasize that resilience assessments provide the basis for building resilience as a precondition for achieving inclusive and sustainable development, peace, and prosperity for all while also highlighting its benefits and relevance to the economy (Hussain et al. 2023).

The Indonesian government has taken steps to strengthen the national defense system by establishing a national reserve component through Law Number 23 of 2019 concerning the management of national resources for state defense. Article 1, paragraph 9 of the law defines the reserve component (*Reserved components*) as a national resource that has been prepared to be activated through mobilization, to strengthen and enlarge the strength and capabilities of the main components (Indonesian National Armed Forces) (Indrawan & Efriza 2018). The concept of national resources in Law Number 23 of 2019 refers to several components, namely citizens/human resources, natural resources, artificial resources, as well as facilities and infrastructure (Hidayat 2022, Roringkon et al. 2022). Reserve component personnel have the potential to assist in various aspects of disaster management, such as evacuation, search and rescue, logistics distribution, and post-disaster rehabilitation.

The Penta helix collaborative approach in disaster management is crucial in facing complex disaster risks. By involving various stakeholders, including the government, non-governmental organizations, the private sector, and the community (pentahelix), effective cooperation in disaster response is expected to be achieved (Djuyandi & Hendradjaja 2021, Syamsunasir et al. 2023). The pentahelix collaboration in engaging reserve component personnel aims to enhance preparedness, expedite response, mitigate disaster impacts, and strengthen disaster resilience in the area. Therefore, analyzing the practices of pentahelix collaborative disaster management in engaging reserve component personnel is essential to understanding the effectiveness and challenges of disaster mitigation at the local level.

MATERIALS AND METHODS

Research Approach

This research utilizes a qualitative research method with a case study approach. The case study approach was chosen because this research aims to understand and analyze in depth how to build collaboration with the five Penta helix stakeholders in the process of engaging reserve component personnel for disaster resilience in the Malang Regency.

Research Location

The research was conducted at various locations in Malang Regency, East Java, including the office of the Regional Disaster Management Agency (*BPBD*) of Malang Regency in Wonorejo, Kodim 0818/Malang in Blimbing, Brawijaya University in *Lowokwaru*, PT. Pindad Turen in Turen, the Humanitarian Network of East Java in Kepanjen, Radar Malang in Mojolangu, and disaster-prone villages in Malang Regency. *BPBD* and *Kodim* 0818/Malang were the main focus for obtaining information related to disaster management and the role of reserve component personnel. Meanwhile, Brawijaya University, PT. Pindad Turen and the Humanitarian Network of East Java provided academic support, logistics, and community information. Radar Malang was expected to provide information and education through the mass Media. The research also involved disaster-prone villages to understand the experiences of the community and their needs related to disaster management.

Data Sources

The research on "Collaboration Model Involving Reserve Component Personnel in Disaster Resilience in Malang Regency" utilizes various data sources to obtain comprehensive and accurate information. The informants involved include the Head of the Regional Disaster Management Agency (*BPBD*) of Malang Regency, relevant staff from *BPBD* of Malang Regency, research staff of Disaster Management/Bravo (Brawijaya Volcanology) at Brawijaya University, Human Resource Development (HRD) staff of PT. Pindad in Turen, Malang, the chairman of volunteers of the Humanitarian Network of East Java, HRD staff of Radar Malang, reserve component personnel of Kodam V/Brawijaya, and personnel of *BPBD* of Malang Regency. There were a total of nine (9) informants selected as research samples who were considered qualified and most knowledgeable about the research topic.

Additionally, documents such as Law Number 23 of 2019 concerning the Management of National Resources for State Defense, the National Disaster Management Plan (*RNPB*), the Regional Disaster Management Plan (*RPBD*) of Malang Regency, Reports on the Involvement of Reserve Component Personnel by the Regional Disaster Management Agency (*BPBD*) of Malang Regency, and research reports and publications related to the involvement of Reserve Component Personnel in Disaster Management will serve as primary data sources.

Data Collection Techniques

Informants: The informants in the research are as follows: *First*, the Regency Military Commander (*Dandim*) of 0818/Malang Regency, the Head of the Regional Disaster Management Agency (*BPBD*) of Malang Regency, relevant staff from government agencies, disaster research staff from *Bravo* (Brawijaya Volcanology) at Brawijaya University, HRD staff from PT. Pindad Turen, Malang, the chairman of the volunteer network "*Jaringan Kemusiaan*" East Java, and HRD staff from Radar Malang. *Second*, personnel from the Regional Disaster Management Agency (*BPBD*) of Malang Regency and reserve personnel from *Kodam* V/Brawijaya.

In-depth interview: The interview will be conducted in a structured manner based on interview guidelines that will be prepared beforehand.

Document study: Collecting secondary data through mass Media clips, government archives, regulations, books, journals, images and photos, and others.

Focus group discussion (FGD): FGD is conducted independently with each relevant party to explore the strengths and weaknesses of ongoing facts with concepts created from the interpretations of the relevant parties.

Data Analysis

Data analysis is conducted in several stages. First, content analysis is performed on the interview results, document studies, and FGDs to identify the main themes and patterns emerging from the collected data. The second stage is thematic analysis, where data is categorized based on emerging themes, and relationships between existing themes are identified. This process helps in understanding the deeper context related to the research topic. Furthermore, data triangulation is conducted, which involves comparing data obtained from various sources to ensure the

validity and reliability of the data used in the research. By conducting data triangulation, it can be ensured that the data used is an accurate representation of the phenomenon under study; thus, the resulting analysis can be trusted and has high reliability.

RESULTS AND DISCUSSION

Research Location Description

Malang Regency is located between 112°17'10.9" to 122°57'00.00" East Longitude and 7°44'55.11" to 8°26'35.45" South Latitude. Its area is approximately 3,347.8 km², making it the second largest after Banyuwangi Regency in East Java. More than 50 percent of its area is agricultural land, including rice fields, gardens, and plantations. The average temperature ranges from 19°C to 27°C, making it a cool area sought after as a place for living and relaxation. Malang Regency is surrounded by six regencies and the Indonesian Ocean. Its boundaries include Pasuruan Regency, Probolinggo, Lumajang, the Indonesian Ocean, and Blitar Regency, as well as bordering Kediri Regency and Mojokerto Regency. Consisting of mountains and peaks, Malang Regency has a topography that supports vast forest potential and serves as a water source through agricultural irrigation rivers. Some famous mountains in this area are Mount Semeru (3,676 meters), Mount Kelud (1,731 meters), Mount Welirang (3,156 meters), and Mount Arjuno (3,339 meters). Its average elevation is 524 meters above sea level (BPBD 2020).

Penta helix Collaboration

The Penta helix collaboration involving reserve component personnel in disaster resilience in the Regency involves five main actors.

Academia

Table 1 summarizes the roles and contributions of academia as reserve components in disaster resilience in Malang Regency. Through research and development, support for disaster management activities, and coordination and collaboration with various stakeholders, academia can provide significant contributions to enhancing disaster resilience.

Table 1: Academia as reserve component personnel in disaster resilience.

Aspect	Description	Note
Disaster Management Resources (DMR)	Faculty and students through community service and CBL (community-based learning).	Interview on Friday, January 12, 2024, at the Bravo GRC Office, Brawijaya University, Malang.
	Educators across interdisciplinary fields between faculties and external parties.	
	Faculties of Mathematics and Natural Sciences, Engineering, Social and Political Sciences, Medicine, Informatics, Agriculture, Fisheries, Law, and Social Sciences.	
Support for Disaster Management Activities (DMA)	Support from the university and collaboration with other universities through MoUs.	
Challenges in Disaster Management Collaboration (DMA)	Complex coordination with relevant agencies and institutions for activity permits.	
	Activities need to align with the strategic plans and needs of the relevant agencies.	
Views on Involving Reserved Components Personnel	Enhancing the effectiveness and efficiency of work units, especially in emergency response.	
	Necessary involvement, particularly in post-disaster management.	

Aspect	Description	Note
	Collaboration schemes among academia, the military, volunteers, and other stakeholders need to be designed.	
Conflict in Collaboration	So far, there have been no significant conflicts.	
Regulations Related to Disaster Management (DM)	The Universitas Brawijaya 2021–2025 Strategic Plan on Disaster and Environmental Affairs aligns with disaster management regulations.	
Disaster Management Collaboration Forum (DMCF)	The Disaster Management Forum (DMF) is formed as a study or research group, such as the BRAVO GRC and PSKK (Center for Earth and Disaster Studies).	
Inclusive Participation	All parties involved in the collaboration participate inclusively.	
Transparency	Collaboration among stakeholders is transparent.	
Leadership	The chairperson of the study group/center for disaster studies at Brawijaya University, which deals with disaster management issues, is considered most suitable to lead the collaboration.	
Trust	Each stakeholder should be able to build trust in the collaboration with all involved parties.	
Information Transparency	Face-to-face dialogues are crucial for gaining understanding and agreement regarding the scope and extent of work from each party involved in the collaboration.	
Commitment of Brawijaya University	Brawijaya University has a high commitment to collaborating on disaster management.	
Enhancing Pentahelix Collaboration	Shared understanding based on the Pentahelix model implemented in regular meetings involving all stakeholders. All components or stakeholders are involved, ensuring alignment of perceptions.	
Coordination System Involving Reserved components	The coordination system involving <i>Reserved components</i> in disaster management is crucial.	

Source: primary data processed (year 2024).

Business

Business actors play a crucial role in enhancing disaster resilience through various forms of contribution and collaboration. One of the companies actively involved in these efforts is PT Pindad (Table 2). The company provides assistance through its Corporate Social Responsibility (CSR) program to support disaster management. Additionally, PT Pindad also has several reserve component personnel who may be increased in the future and support humanitarian aid for disasters from various parties.

Table 2: Business (PT. Pindad) as reserve component personnel in disaster resilience.

Aspect	Description	Note
Role of PT Pindad	Providing assistance in the form of CSR for disaster management.	

Aspect	Description	Note
Challenges in Collaboration	Having 8 <i>Reserved components</i> personnel and the possibility of increasing in the future.	Interview on Thursday, January 11th, 2024, at PT Pindad's office in Malang.
	Supporting humanitarian assistance for disasters from various parties.	
	Distribution of aid during disaster emergency response is still complicated.	
	Further training is needed for <i>Reserved components</i> personnel.	
View the Pentahelix Collaboration	A legal framework is needed for the involvement of <i>Reserved components</i> personnel.	
	PT Pindad has not been involved in formal collaboration forums.	
	Inclusive participation is achieved by carrying out the tasks and responsibilities of each stakeholder.	
View on Leadership and Trust	There is transparency in the collaboration.	
	<i>BNPB/BPBD</i> is considered the most suitable to lead the collaboration	
View on Transparency	Stakeholders can build trust, but adjustments are needed for disaster management conditions.	
	Face-to-face dialogue is considered key to transparency.	
PT Pindad's Commitment	PT Pindad has never been invited to face-to-face dialogue.	
	PT Pindad is committed to supporting every humanitarian activity, including disaster management and national resilience.	
Enhancing Pentahelix Collaboration	A better understanding of the goals and definition of the problem is needed.	
	Training for <i>Reserved components</i> personnel and education for stakeholders and the community are required.	
	Intermediate results are needed to assess activity achievements, create a more effective and efficient coordination system, and serve as parameters for the effectiveness of <i>Reserved components</i> personnel involvement.	

Source: primary data processed (year 2024).

Community

Community actors play a vital role in enhancing disaster resilience by utilizing local potential and providing direct assistance in the field. One example is the *Jaring Kemanusiaan Jawa Timur (JKJT)* community, which has field influencer teams consisting of 25 members per team to assist in disaster-affected areas (Table 3). *JKJT* focuses on empowering the potential of communities in disaster-prone areas and receives support from various parties for disaster management activities.

Table 3: Interview Results from the *Jaring Kemanusiaan Jawa Timur (JKJT)* Community (Community Element) as Reserve Component Personnel in Disaster Resilience.

Aspect	Description	Note
Resources of JKJT	The field influencer team consists of 25 members per team to assist on the ground.	The interview was conducted on Friday, January 10th, 2024, at the JKJT Headquarters in Malang.
	Empowering the potential of the community in disaster-affected areas.	
Support for DMA Activities	Support from various parties is quite good.	
	Quick and uncomplicated coordination is needed for disaster victims' assistance.	
Challenges in DMA Collaboration	Miscoordination, complicated bureaucracy, and suboptimal distribution of aid.	
Perspective on the Involvement of Reserved Components Personnel	Personnel from Reserved components can be involved, but they need preparation and training.	
Perspective on Conflict	Conflict arises due to complicated bureaucracy, whereas the situation on the ground requires speed.	
Regulations Related to DMA	Law Number 24 of 2007 concerning Disaster Management.	
DMA Collaboration Forum	Focus Group Discussions (FGDs) are organized periodically by BPBD.	
Inclusive Participation	All involved parties participate inclusively and work together to assist disaster victims.	
Transparency	Reports and transparency regarding aid distribution are communicated to volunteers and joint teams in the field.	
Leadership	BNPB/BPBD is considered the most suitable to lead the collaboration.	
Trust	Trust can be well established, but job clusters are needed to avoid blaming each other and streamline disaster management.	
Information Transparency	Dialogue is the key to understanding roles and rights of support in collaboration, as well as to enhancing responsibility and humanitarian principles.	
Commitment of JKJT	JKJT is committed to upholding humanity, strengthening national resilience, and assisting as many disaster victims as possible.	
Improvement of Pentahelix Collaboration	Sharpening the collective understanding of the goals, problem definitions, and values to be achieved by creating job clusters.	
	Tracking the achievements of DMA activities through interim results for future evaluation and improvement.	
	Involving Reserved components in collaboration by clarifying its basic norms and legal foundations.	

Source: primary data processed (year 2024).

Government

The government, through the Malang Regency Regional Disaster Management Agency (BPBD), has a crucial role in strengthening disaster resilience by utilizing sufficient resources but requires strengthening in the field. Malang Regency BPBD and Kodim 0818/Malang Regency work together to provide support in collaborative disaster management, which is quite good despite facing challenges such as data accuracy, technical aspects of aid distribution, shortage of workers, vehicles, and public understanding of disasters (Table 4).

Table 4: Interview Results with the Government as Reserves for Disaster Resilience.

Aspect	Description	Note
Resources	The Regional Disaster Management Agency (BPBD) of Malang Regency has sufficient resources but still requires reinforcement in the field (BPBD Malang Regency).	
	The Regency Military Command (Kodim) 0818/Malang Regency has 431 Babinsa personnel distributed across all Regencys (Kodim 0818/Malang Regency).	
Support for Disaster Management Activities	Support from various parties in disaster management collaboration is quite good. (BPBD of Malang Regency, Kodim 0818/ Malang Regency).	
Challenges in Disaster Management Collaboration	The accuracy of data and technical aspects of aid distribution, the lack of manpower and transport vehicles, and the community's mindset about disasters (BPBD of Malang Regency).	<ul style="list-style-type: none"> • Interview on Monday, January 8, 2024, at the Office of the Regional Disaster Management Agency (BPBD) of Malang Regency.
	The dynamic conditions in the field, especially during aid distribution (Kodim 0818/ Malang Regency).	
Perspectives on the Involvement of Reserve Personnel	The involvement of Reserved components personnel can help strengthen disaster resilience in Malang Regency (BPBD of Malang Regency, Kodim 0818/ Malang Regency).	<ul style="list-style-type: none"> • Interview on Tuesday, January 9, 2024, at the Office of the Regency Military Command (Kodim) of Malang Regency.
	Training and disaster management education are needed for Reserved components personnel (BPBD of Malang Regency).	
	A clear legal framework is needed regarding the involvement of Reserved components personnel in disaster management (Kodim 0818/Kab. Malang).	
Perspectives on Conflict in Collaboration	Conflicts that occur during the disaster management collaboration process tend to be minimal (BPBD of Malang Regency, Kodim 0818/ Malang Regency)	
	Conflicts usually arise due to a lack of personnel to assist in aid distribution (BPBD of Malang Regency).	
Regulations Related to Disaster Management	Law Number 24 of 2007 concerning Disaster Management (BPBD of Malang Regency, Kodim 0818/ Malang Regency)	
	Law Number 34 of 2004 concerning the Indonesian National Defense Forces (Kodim 0818/ Malang Regency).	
Collaboration Forums for Disaster Management	Focus Group Discussions (FGD) are organized periodically by the Regional Disaster Management Agency (BPBD) (BPBD of Malang Regency).	
	Periodic disaster management forums are held by the BPBD of Malang Regency (Kodim 0818/ Malang Regency).	

Aspect	Description	Note
Inclusive Participation in Collaboration	All parties involved participate inclusively and work hand in hand in assisting disaster victims (<i>BPBD</i> of Malang Regency, Kodim 0818/ Malang Regency)	
Transparency collaboration	Transparency in the collaboration process among stakeholders in Malang Regency is working well (<i>Kodim</i> 0818/ Malang Regency). Budget utilization reports and information related to disaster management activities are provided to ensure transparency (<i>BPBD</i> of Malang Regency).	
Leadership Collaboration	BNPB/ <i>BPBD</i> is considered the most appropriate entity to lead the collaboration (<i>BPBD</i> of Malang Regency, Kodim 0818/ Malang Regency)	
Trust in Collaboration	Trust can be built effectively throughout the collaboration process (<i>BPBD</i> of Malang Regency, Kodim 0818/ Malang Regency) Adaptation and training for <i>Reserved components</i> personnel are needed to foster better trust (<i>Kodim</i> 0818/ Malang Regency).	
Information Transparency Collaboration	Regular face-to-face dialogues are conducted to ensure information transparency (<i>Kodim</i> 0818/ Malang Regency). There is a need for inherent coordination regarding the command functions and tasks of <i>Reserved component</i> personnel in the field (<i>Kodim</i> 0818/ Malang Regency).	
Government Stakeholders' Commitment	Commitment to strengthen national resilience through collaboration in disaster management (<i>BPBD</i> of Malang Regency, <i>Kodim</i> 0818/ Malang Regency). Commitment to assist the people, especially during disaster events (<i>Kodim</i> 0818/ Malang Regency).	

Source: primary data processed (year 2024).

Media

The role of the media as supporting personnel in enhancing disaster resilience is explored in Table 5. The media, especially Radar Malang, has coverage teams in disaster areas ready to support disaster management activities. Support from various parties within the media institution is highly beneficial for disaster management collaboration.

Table 5: Interview Results with Media (*Radar Malang*) as Auxiliary Personnel in Disaster Resilience.

Aspect	Description	Note
Resources	The media has reporting teams in disaster areas ready to support disaster management activities.	
Support for Disaster Management Activities	Support from various parties within the media institution is highly beneficial for disaster management collaboration.	Interview on Tuesday, January 9, 2024, at the Editorial Office of Radar Malang.
Challenges in Disaster Management Collaboration	The limited supporting facilities for disaster management activities, considering the vast area of Malang Regency and the high number of communities vulnerable to disasters.	

Perspectives on the Involvement of Reserved Components Personnel	Involvement of Reserved components personnel is necessary as they are part of the national defense system and have the potential to strengthen national resilience through disaster management.
	Clear regulations are needed regarding the involvement of Reserved components personnel in disaster management.
Perspectives on Conflict in Collaboration	During the disaster management collaboration process, there have been no significant conflicts.
Regulations Related to Disaster Management	Law Number 24 of 2007 concerning Disaster Management.
Collaboration Forum for Disaster Management	Inclusive forums already exist, but the media has not been involved yet.
Inclusive Participation in Collaboration	All parties involved in disaster management collaboration participate inclusively in the process.
Transparency in collaboration	Transparency in the collaboration process among stakeholders in disaster management is already in place, with important aspects such as the disclosure of budget expenditure reports for disaster management activities.
Leadership in Collaboration	BNPB/BPBD is deemed the most suitable party to lead disaster management collaboration.
Trust in Collaboration	Trust can be built well within the collaboration process, and the involvement of Reserved components can strengthen this trust.
Openness of Information in Collaboration	Face-to-face dialogue becomes crucial for understanding the openness of information regarding disasters and disaster management.
	This dialogue also needs to involve Reserved components personnel if they are involved in disaster management.
Commitment of Media Stakeholders	The commitment of the media is to continue supporting and promoting disaster management collaboration to be more effective and help educate the public about disaster mitigation.
Understanding the Goals of Collaboration	Stakeholders have a sufficient understanding of the objectives of disaster management collaboration. This understanding should also be possessed by <i>Reserved component</i> personnel if they are involved.
Measurement of Collaboration Achievement	Interim results are crucial to assessing the extent of achievement in disaster management collaboration. These interim results also serve as benchmarks for Reserved components personnel if they are involved.

Source: primary data processed (year 2024).

Pentahelix Collaboration Model for Involving Reserve Component Personnel in Disaster Resilience in Malang Regency

The pentahelix collaboration model offers a comprehensive approach to involving reserve component personnel in disaster resilience in Malang Regency. Based on research findings related to the Penta helix collaboration model in disaster management in Malang Regency, several important aspects are discussed, including:

Effectiveness of the Penta helix Collaboration Model

The Penta helix collaboration model in Malang Regency has several strengths and weaknesses that need to be considered to enhance its effectiveness in improving disaster resilience.

Table 6: Strengths and Weaknesses of the Pentahelix Collaboration Model.

Strengths	Weaknesses
Inclusive participation from various actors, including academia, businesses, communities, government, and the Media	Lack of coordination and communication among actors
Transparency in the collaboration process and budget utilization	Limited resources in the field.
Clear leadership from <i>BNPB</i> and <i>BPBD</i>	inadequate understanding of the roles and responsibilities of each actor.
Commitment from stakeholders to strengthen disaster resilience	Suboptimal involvement of Reserved components personnel.

Source: primary data processed (year 2024).

The efforts to address the weaknesses, as shown in Table 6, regarding the effectiveness of the Pentahelix Collaboration Model in involving reserve component personnel in disaster resilience can be carried out in several ways, including:

a. Strengthening coordination and communication among actors

Strengthening coordination and communication among actors through more effective collaborative forums. According to Martin et al. (2016), poor inter-organizational partnerships are barriers to successful disaster response. Therefore, coordination and communication among actors can be enhanced by facilitating strong bonding capacities among members, enabling efficient bridges to the entire network that enhance information processing and advocacy for member needs (Wiechman et al. 2024).

b. Enhancing resource capacity

Enhancing resource capacity in the field through training and the provision of adequate equipment. This is in line with Gundran et al.'s (2023) opinion that to improve disaster training, it is necessary to introduce various topics and scenarios, as well as implement modern technology.

c. Clarifying the roles and responsibilities of actors

Clarifying the roles and responsibilities of each actor in the collaboration document. According to Sentanu et al. (2021), the five actors in the Penta Helix concept should walk hand in hand and cooperate well, both as written in official documents such as job descriptions (tupoksi) and practically in the implementation of programs and activities.

d. Developing guidelines and regulations

Clear guidelines and regulations regarding the participation of Reserved components personnel in disaster management efforts need to be developed. The existence of military reserve components is a strategic step by the government to enhance national defense against threats in line with the strategic environmental dynamics in the 21st century. Therefore, military reserve components need to have a strong constitutional basis in accordance with the mandate of the National Defense Law (Roringkon & Saputro 2021), especially in carrying out their roles in disaster management.

By addressing the weaknesses and implementing the suggestions above, it is hoped that the pentahelix collaboration model in Malang Regency can become an effective model for enhancing disaster resilience in

the region. As highlighted by Kurniadi et al. (2023), the synergistic effect of the pentahelix can enhance community resilience, meaning that the pentahelix collaboration model involving reserve component personnel can contribute to disaster resilience.

Contribution of Each Actor

The Penta helix collaboration model in Malang Regency involves five main actors: academia, business, community, government, and Media. Each actor has unique roles, resources, and constraints in contributing to disaster management.

a. Academia

The contribution of academia as reserve component personnel to disaster resilience includes:

- Providing knowledge and concepts for developing effective and sustainable disaster management programs.
- Conducting research and community service to help enhance disaster resilience in Malang Regency.
- Offering training and education to the community on disaster mitigation.

b. Business

The contribution of businesses, such as PT. Pindad, as reserve component personnel in disaster resilience, involves three main points:

- Providing CSR assistance to support disaster management activities.
- Assisting in the distribution of aid and logistics.
- Providing training and education to employees on disaster response.

c. Community

The contribution of community actors, such as volunteers from the East Java Humanitarian Network, as reserve component personnel in disaster resilience includes:

- Actively participating in mitigation, emergency response, and post-disaster rehabilitation activities.
- Providing assistance and support to disaster victims.
- Raising awareness among the community about the importance of disaster preparedness.

d. Government

The contribution of government actors, including the Directorate General of Defense Potential of the Ministry of Defense of the Republic of Indonesia (*Ditjen Potan Kemhan* RI), the Regional Disaster Management Agency (*BPBD*) of Malang Regency, and the Regency Military Command (*Kodim*) of Malang Regency, as reserve component personnel in disaster resilience, includes:

- Formulating policies, regulations, and coordination to ensure the effectiveness of disaster management programs.
- Providing resources and infrastructure necessary for disaster management activities.
- Leading and coordinating collaboration among actors in disaster management.

e. Media

The contribution of media actors, such as Radar Malang, as reserve component personnel in disaster resilience includes:

- Disseminating information and education to the public about disaster risks, prevention measures, and emergency response.
- Assisting in raising public awareness about the importance of disaster preparedness.
- Monitoring and reporting on the development of disaster situations to the public.

The Penta helix collaboration in Malang Regency requires active contributions from all involved parties. By understanding the roles, resources, challenges, and obstacles of each actor, this collaboration can become an effective model for enhancing disaster resilience in the region (Subagyo et al. 2022).

Challenges and Barriers to Collaboration

The Penta helix collaboration model in Malang Regency, despite having considerable potential, still faces several challenges and barriers that need to be overcome to achieve optimal effectiveness. These challenges and barriers can be categorized into several aspects, namely:

- a. Lack of coordination and communication among actors.
- b. Limited resources in the field.
- c. Lack of understanding of the roles and responsibilities of each actor.
- d. Suboptimal involvement of Reserved components personnel.
- e. Miscoordination and complex bureaucracy in aid distribution.
- f. Insufficient training and education for Reserved components personnel and the community.
- g. Lack of a clear legal framework regarding the involvement of Reserved components personnel.

The challenges and obstacles faced in the Penta helix collaboration in Malang Regency indicate that there is still ample room for improvement for this collaboration to achieve optimal effectiveness (Prajanti et al. 2023). Efforts to address these challenges and barriers need to be undertaken continuously and involve all relevant parties. By overcoming the existing challenges and barriers, it is hoped that the Penta helix collaboration in Malang Regency can become an effective model for enhancing disaster resilience in the region.

Efforts to Enhance Collaboration

Based on the analysis of the challenges and obstacles faced, here are several efforts that can be undertaken to enhance the effectiveness of Penta helix collaboration in Malang Regency:

- a. Strengthen coordination and communication among actors through more effective collaborative forums.
- b. Enhance resource capacity in the field through training and the provision of adequate equipment.
- c. Clarify the roles and responsibilities of each actor in collaboration documents.
- d. Develop clear guidelines and regulations regarding the involvement of Reserved components personnel in disaster management.
- e. Increase training and education for Reserved components personnel and the community.
- f. Build an effective and efficient coordination system involving Reserved components personnel.
- g. Create job clusters to clarify the tasks and responsibilities of each actor.

- h. Involve Reserved components personnel in face-to-face dialogues to enhance information transparency.
- i. Measure the achievements of collaborative activities through interim outcomes for evaluation and future improvement.

Improving the effectiveness of pentahelix collaboration in Malang Regency requires comprehensive and sustainable efforts. These efforts need to focus on aspects such as coordination and communication, resource capacity, roles and responsibilities, guidelines and regulations, as well as training and education (Khorram-Manesh et al. 2016, Nugraha et al. 2023). By addressing the challenges and obstacles, it is hoped that Penta helix collaboration in Malang Regency can become an effective model for enhancing disaster resilience in the region.

The analysis of stakeholder engagement in the Penta helix for disaster resilience in Malang Regency covers three main stages: before, during, and after disasters. Before a disaster, academics conduct research to understand risks and develop mitigation strategies, as well as organize training and provide research-based policy inputs. The business sector contributes through CSR programs, employee training, and participation in collaboration forums. Communities are active in education, forming volunteer groups, and mapping local resources. The government develops regulations and policies, allocates budgets, and builds disaster-resistant infrastructure. Media plays a role in awareness campaigns, public education, and disaster risk monitoring.

During a disaster, academics provide technical support, conduct rapid disaster impact assessments, and help develop emergency response systems. The business sector provides logistical support, assists in aid distribution, and opens facilities to support emergency operations. Communities carry out emergency response actions, provide social assistance, and manage evacuation centers. The government leads and coordinates all emergency response activities through the BPBD, provides emergency assistance, and maintains security in affected areas. The media provides up-to-date information, disseminates emergency response education, and reports urgent needs in the field.

After a disaster, academics evaluate disaster impacts, develop recovery programs, and provide technical assistance for community rehabilitation. The business sector supports reconstruction, aids economic recovery, and collaborates with the government and NGOs on rehabilitation projects. Communities engage in rehabilitation, provide psychosocial support, and enhance disaster preparedness capacity for the future. The government leads infrastructure reconstruction, provides financial aid, and improves policies based on experience. The media documents recovery efforts, disseminates information on the recovery process, and advocates for better policies and increased disaster response capacity. With active engagement from all stakeholders, disaster resilience in Malang Regency is expected to be enhanced at every stage.

Through active and collaborative engagement of all stakeholders via the Penta helix model, disaster resilience in Malang Regency is expected to be enhanced from pre-disaster to post-disaster stages. Sudarmanto et al. (2020) and Rozikin et al. (2023) indicate that the level of stakeholder engagement in community-based disaster resilience projects is crucial for the successful implementation of disaster management programs. Thus, this study provides an overview of the pentahelix collaboration model in disaster management in Malang Regency, identifying strengths, weaknesses, opportunities, and challenges. The findings of this research can serve as a basis for stakeholders in efforts to enhance collaboration effectiveness and strengthen disaster resilience at the local level.

CONCLUSIONS

The Penta helix collaboration model for engaging reserve component personnel in disaster resilience in Malang Regency offers a comprehensive approach. The analysis of this model demonstrates strengths in inclusive participation from various actors and transparency in the collaboration process. However, there are several weaknesses, such as a lack of coordination and communication among actors and limitations in resources in the field. To enhance its effectiveness, steps such as strengthening coordination, increasing resource capacity, and clarifying the roles of each actor are necessary. Every actor, ranging from academia, business, the community, the government, and the media, plays a crucial role in this collaboration model. However, challenges include insufficient coordination and communication, resource limitations, and a lack of understanding of actor roles. To address these, efforts to strengthen coordination, enhance capacity, and clarify the roles of each actor are needed.

Several recommendations have been identified to enhance this collaboration, such as strengthening coordination and communication among actors, enhancing training and education, and developing clear guidelines

and regulations regarding the involvement of reserve component personnel. With the implementation of these recommendations, it is hoped that the Penta helix collaboration model can become more effective and make a significant contribution to disaster management in Malang Regency.

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