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Article

Intergovernmental networks and local government capacity for disaster management in North Sumatra

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Abstract: The objective of this study is to examine the impact of decentralization on disaster management in North Sumatra Province. Specifically, it will analyze the intergovernmental networks, local government resilience, leadership, and communication within disaster management agencies. The study used a hybrid research approach, integrating qualitative and quantitative methodologies to investigate the connections between these factors and their influence on disaster response and mitigation. The study encompassed 144 personnel from diverse government tiers in North Sumatra and performed a meta-analysis on the implementation of disaster management. Intergovernmental networks were discovered to enhance collaboration in disaster management by eliminating regulatory gaps and efficiently allocating logistics. Nevertheless, local governments have obstacles as a result of limited resources and inadequate expertise, notwithstanding the progress made in infrastructure technology. The *F* test results reveal that leadership and communication have a substantial impact on the performance of BPBD personnel. The meta-assessment classifies its impact as extraordinarily high, suggesting comprehensive evaluation and successful achievement of goals in disaster management planning. Efficient cooperation among relevant parties is essential in handling calamities in North Sumatra. The government, commercial sector, NGOs, universities, and society have unique responsibilities. To improve effectiveness, governments should encourage private sector involvement, while institutions can increase their research contributions.

Keywords: decentralization; intergovernmental networks; capacity; disaster management; local government

1. Introduction

The occurrence of calamities is recognized to be unavoidable. According to the World Health Organization (2002), a disaster is an event that disturbs the usual conditions of a society and leads to a level of suffering that exceeds the community's ability to cope. The term "disaster" is applicable to an occurrence induced by external sources only when the target's capacity is poor or it has a high susceptibility. Disasters can be classified into three types: natural, man-made, and hybrid. All disasters have a fundamental characteristic: their intensity (Shaluf, 2007). Natural risks are responsible for the majority of disasters. There is a consensus that decentralizing the disaster management sector enhances the efficiency and promptness of local administration in addressing calamities. Although some researchers argue that decentralization offers potential benefits in intergovernmental networks, institutional capacity building, and disaster management regulation, there is a scarcity of empirical evidence to substantiate this assertion. There is a lack of comprehensive research that has

measured or analyzed the relationship between decentralization and disaster management, especially when it comes to evaluating its implementation in developing nations.

Disasters are predominantly encountered at a local level. It is highly unusual for a catastrophe to strike a whole nation simultaneously. The existing body of literature on disaster management argues that the involvement of local governments is crucial in ensuring the successful implementation of disaster management strategies. The distinctive position of local governments facilitates a well-informed comprehension of the requirements and demands of the community. The references cited are Bae et al. (2016) and Baba and Tanaka (2015). Constructing efficient disaster governance is a significant obstacle every nation encounter in its endeavors to mitigate the impacts of disasters. The hyogo framework for action (HFA) was ratified in 2005 and subsequently strengthened by the Sendai Framework for Action (SFA) in 2015. An essential objective of this global framework is to enhance the efficacy of local governments as crucial participants in disaster management (Jones et al., 2013).

Governments, particularly in developing nations, face a substantial problem regarding disaster management. They encounter several challenges related to insufficient manpower, political instability, and economic mismanagement by governments (Setiadiet et al., 2010). It is important to mention that local governments are anticipated to have a prominent position in managing disasters. Hence, it is imperative to establish decentralized disaster management systems. Asian emerging countries, many of which are currently undergoing decentralization, have yet another difficulty. Hence, the crucial matter in those countries is ascertaining the appropriate design for a decentralized catastrophe management system. Decentralization, as defined in this study, refers to transferring the power and accountability for government operations from the central government to local governments (Rondinelli et al., 1983). The devolution of governmental authority from the central government to autonomous areas leads to the transfer of power through delegation, sometimes called the delegation of authority (Tallberg, 2002).

Local governments are regarded as one of the least researched institutions in catastrophe literature (Wolensky and Wolensky, 1990). The majority of research on local governments as public organizations in disaster management focuses on assessing their capacity (Anantasari et al., 2017; McGuire and Silva, 2010; Nicholson, 2007) or their participation in disaster management (Djalante et al., 2017). Furthermore, the examination of the capacities of local governments is still undervalued or insufficient, which contributes to their insufficiency in the literature on disasters. Winter (2003) recognized the significance of organizational capabilities in the public sector (Wang and Kuo, 2014). This has led to additional research on local governments, which are crucial public organizations, especially in terms of their abilities in disaster management (Lee, 2019; Nilsson, 2010; Palm and Ramsell, 2007; Prabhakar et al., 2009; Rahm and Reddick, 2011; Reddick, 2007; Thacher, 2005).

For this study, we have chosen North Sumatra Province in Indonesia as a case study. We find Indonesia to be a compelling location to investigate disaster management due to its decentralized system. Indonesia introduced the notion of decentralization about twenty years ago, implementing it throughout all administrative, political, and fiscal domains concurrently (Shah and Thompson, 2004). Indonesia

underwent a significant shift towards decentralization, changing from being highly centralized to becoming one of the most decentralized countries globally (Leer, 2016). The decentralization process in Indonesia commenced with the implementation of law number 23, sometimes referred to as the Regional Autonomy Law, which was enacted in 2014. This legislation fundamentally alters the entire execution of the governmental system in Indonesia (Amri, 2020).

From 2019 to 2023, Indonesia encountered a total of 16,706 natural catastrophes, including floods, landslides, abrasion, tornadoes, drought, forest and land fires, earthquakes, tsunamis, and volcanic eruptions (Haris et al., 2023). Moreover, statistics obtained from BNPB revealed that there were four types of disasters that exhibited a significant frequency in Indonesia from 2019 to 2023. These include: (1) Tornadoes (4628 incidents), (2) Floods (4370 incidents), and (3) Landslides (4109 incidents). The costs incurred from these many calamities are substantial, encompassing loss of life, property, infrastructure damage, and the halt of economic output and daily routines. The current implementation of regional autonomy emphasizes decentralization, resulting in a diminished role for the central government. This has led to a challenge in terms of regional resistance and the increasing dominance of local governments. Additionally, there is a need to develop a comprehensive and cross-sectoral roadmap for regional disaster management that involves multiple stakeholders.

North Sumatra is extremely susceptible to disasters and is ranked second nationally in terms of the frequency and variety of catastrophe events (De Priester, 2016). The graph illustrates the potential dangers present in North Sumatra Province.

Figure 1 reveals that the number of disaster hazards in North Sumatra Province is notably high, particularly regarding the indicators of people exposed and the area of danger (ha). This is due to the province being susceptible to various disaster risks, including floods, landslides, abrasion, tornadoes, drought, forest and land fires, earthquakes, and volcanic eruptions. From 2019 to 2023, the North Sumatra Province faces four significant disaster risks: floods, landslides, tornadoes, and forest and land fires. These hazards are dispersed over all districts and cities in the province. The disaster statistics in North Sumatra Province are classified as high. The tabulated data presents the varying figures of disasters recorded between 2019 and 2023 (**Table 1**).

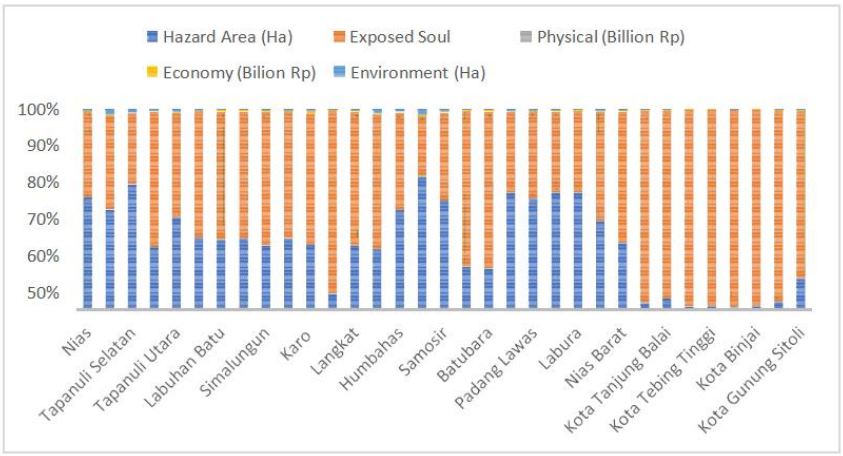

Figure 1. North Sumatra Province's potential disaster risks in 2023.
Source: BNPB, 2023.

Table 1. Number of disasters in North Sumatra Province 2019–2023.

Year	Number of disasters
2019	71
2020	150
2021	228
2022	104
2023	267

Source: BPBD North Sumatra, 2023.

The researchers conducted a comprehensive analysis of the vision, mission, and program of the regional leader, as well as the strategic plans of various ministries and institutions. They also reviewed the strategic plan of the BPDB of North Sumatra Province, the strategic plan of the Regency/City BPBD, and assessed the spatial plan and strategic environmental impact. At the national level, disaster management efforts need to be conducted in a comprehensive and systematic manner. However, there are two main obstacles that hinder these efforts: (1) Insufficient effectiveness of disaster management organizations and institutions; (2) Limited awareness of disaster risks and understanding of preparedness measures.

By analyzing the main problems identified through field research on the implementation of intergovernmental networks and the capacity of local governments in disaster management, strategic issues that must be addressed for future disaster management can be determined. It is important to recognize that strategic issues must be given attention and prioritized in all development planning efforts in North Sumatra Province, particularly in relation to disaster management. This is strongly linked to intergovernmental networks and the ability of local governments. The parameters used to ascertain strategic issues are as follows:

- If left unresolved promptly, it will result in an economic repercussion on the region, especially its infrastructure;
- When difficulties are properly addressed, they can be remedied or contribute to the achievement of other development goals;
- The likelihood of successfully fixing this fundamental issue is great;
- If left unresolved, it will lead to either pain or a loss of community security;
- If left unattended, it possesses the capacity to give rise to further complications, particularly with regards to the environment, or evolve into a hazardous calamity.

Table 2. Displays the hierarchical order of the main concerns.

No	Strategic issues	Weighting by strategic criteria					Total score
		1	2	3	4	5	
1	The majority of settlements are situated in places that are susceptible to disasters.	3	4	3	4	5	19
2	Lack of efficient coordination and collaboration in disaster management, resulting in each unit operating autonomously.	3	4	2	4	5	18
3	The conversion of high peatland/forest is not aligned with the carrying capacity and environmental capacity, leading to the occurrence of hydrometeorological disasters.	4	4	3	4	5	20

Table 2. (*Continued*).

No	Strategic issues	Weighting by strategic criteria					Total score
		1	2	3	4	5	
4	Inadequate management of watershed systems has led to the occurrence of hydrometeorological disasters.	5	5	2	5	5	22
5	Stakeholders have not effectively implemented mitigation efforts.	2	5	4	4	4	19
6	Health services have not been adequately optimized to effectively reach all segments of society, particularly in the areas of crisis monitoring, extraordinary events, and disaster events.	3	4	2	4	5	18
7	Inadequate measures to prevent, suppress, and manage forest and land fires.	2	4	4	3	3	16

Source: Focus Group Discussion (FGD) and Data Analysis, 2024.

According to the scoring findings from the Focus Group Discussion (FGD) which can be seen in **Table 2**, the following strategic concerns have been identified as priorities in North Sumatra:

- Watershed management has not been established with a focus on harmonious and sustainable practices, aimed at maximizing the benefits of water resources for human use. This lack of attention to proper management has resulted in the occurrence of hydrometeorological disasters.
- The peatland ecosystem has not fully regenerated from the inflicted harm, thus deviating from the environmental carrying capacity and producing hydrometeorological disasters.
- Lack of efficient coordination and collaboration in disaster management, with each unit operating autonomously.

In 2007, the Indonesian government enacted the disaster management law (DML) to implement the hyogo framework for action (HFA) at the national level, in keeping with the decentralization of governance across all sectors. The main objective of this new legislation was to enhance the proximity between the government and the citizens by promoting greater participation and democratization. This would result in the establishment of a disaster management system that is both efficient and more transparent (Van and Krukkert, 2010). The development of disaster governance in Indonesia is founded on four key aspects: the formulation of legislation, the building of robust institutions, comprehensive planning, and sufficient finance. In relation to the fourth component, the allocation of funds is distributed among the central, provincial, and municipal governments, with equal obligations, in accordance with the principle of decentralization (Putra and Matsuyuki, 2019). The number of actors in the disaster management system and their roles and networking relationships are likely to vary before and after decentralization. An effective approach to comprehending the implementation of the new disaster management system is to analyze the key institutions involved.

Considering the current situation in North Sumatra, it is crucial to address how to handle regional disasters by collaborating between different levels of government and regions, utilizing a framework based on network governance. In addition to intergovernmental collaboration, the effectiveness of the regency/city administration and the regional government of North Sumatra Province in managing catastrophes is crucial. The primary aim of this research is to identify and examine intergovernmental

networks involved in disaster management in the North Sumatra Province. The second goal is to assess and evaluate the ability of local administrations in North Sumatra Province to effectively handle and control natural disasters.

Given the current situation in North Sumatra, it is crucial to address the topic of regional disaster management by examining the collaboration between different levels of government and regions, employing a comprehensive framework of network governance. Aside from intergovernmental collaboration, the efficacy of the district/city administration and the local government of North Sumatera in managing catastrophes is also crucial. The primary aim of this study is to ascertain and examine the intergovernmental networks involved in disaster management in the province of North Sumatera. The other purposes are to assess and evaluate the resilience of local governments in North Sumatera in dealing with and mitigating the impact of catastrophes, to present empirical data on how the combination of leadership and communication impacts the performance of BPBD personnel, and to assess the execution of disaster management in North Sumatera, providing a comprehensive overview of the current situation.

2. Literature review

2.1. Decentralization

Decentralization, in essence, entails the dispersion of authority from a smaller group of individuals to a broader group, as well as the transfer of authority from a central entity to a less central one (Pollitt, 2005). Decentralization can encompass administrative, political, and fiscal aspects. Administrative decentralization, often called de-concentration, refers to transferring responsibility for certain matters to local branches. The central government appoints these local branches, making them accountable in an upward direction (Treisman, 2007). Political decentralization encompasses both the transfer of power and the granting of exclusive authority to lower levels of government. The lower tiers are answerable to the electorate in a downward manner (Ribot, 2002; Treisman, 2007). Fiscal decentralization refers to the degree to which lower levels of government have the authority to establish their tax bases, select their tax rates, and decide on their public expenditure (Treisman, 2007).

It is widely agreed that decentralization in the disaster management sector enhances the efficiency and adaptability of catastrophe risk governance. Decentralization has been recognized by numerous scholars as a means to enhance transparency (Swyngedouw, 2004), bolster local governments, and enhance the efficacy of government in delivering public services (Kahkonen and Lanyi, 2001). Several scholars, including Breton (1996), Oates (1972), Tiebout (1956), Tresch (1981), and Weingast (1995), have argued that public services are best effective when administered at the level closest to the society they serve (Darmawan, 2008). Given that local governments possess a greater understanding of the requirements of their constituents compared to other organizations, it may be inferred that they are more likely to have the ability to efficiently utilize public monies. Furthermore, competition between different regions may even foster more significant levels of innovation.

The difficulties associated with decentralized catastrophe management are commonly experienced by all emerging nations. Marks and Lebel (2016) elucidated

that although the post-flood scenario in Thailand was characterized by decentralization, the collaboration across various tiers of government remained deficient. The state frequently implemented policies without coordinating with local authorities, resulting in unrealistic policy implementations. According to Sharma et al. (2012), decentralization presents a chance for local governments to effectively handle catastrophe policy on a broader scale. Nevertheless, the authors acknowledge that decentralization might occasionally heighten the risk of disasters in cases when local governments exploit their power to engage in corrupt practices, taking advantage of the expanded opportunities presented by decentralization (Sharma et al., 2012). These circumstances must not be allowed to undermine the role of local governments as the primary agents responsible for disaster management. Enhancing the local government's ability is a rational strategy for enhancing the caliber of disaster management services provided to the populace. This research is anticipated to promote renewed discussion regarding disaster management systems working at the local level. Despite its numerous constraints, local governments must play a crucial role in developing disaster management systems for the population.

2.2. Intergovernmental networks

Intergovernmental cooperation is a formal agreement between two or more governments to work together to achieve shared objectives, deliver services, or collectively address mutual challenges, as defined by the Intergovernmental Cooperation reference (Kurtz, 2002). Public administration offers a relatively robust theoretical basis for examining intergovernmental cooperation. The network approach is one of the most renowned methodologies. According to Adler and Goggin (2005), inter-regional policies are not created without considering external factors. As per the communication model, the inter-regional implementation of policies involves various variables, including factors that attract or persuade. These factors manifest as acts and conditions that enhance the efficacy of policy execution, whereas constraints have the reverse effect.

Several research studies, like those conducted by Goggin and Weichhart, have examined regionalization and interregional cooperation processes. Recently, several experts in the field of public management research have conducted studies that provide evidence for the concepts of intergovernmental management. Weichhart (2002) identifies several elements influencing regionalization and regional collaboration, including global pressure, restricted capacities and potential, and local egos. Goggin (1990) explains several elements that facilitate (inducement factors) and impede (constraint factors) regional collaboration across different levels of government.

A networking format known as a network institutional format consists of multiple organizational units that establish relationships in a highly adaptable manner. Various types of intergovernmental networks exist that are structured in a networking pattern. Agranoff and McGuire (2003) proposed a hierarchy of network degree, categorizing information networks as the least complex type of collaborative network.

- Developmental networks refer to establishing stronger connections between regions, where education and services are provided in addition to exchanging

information. This enhances the ability of regions to share information and address local problems.

- Outreach networks involve the development of programs and strategies for each region, which are then adopted and implemented by other regions, often with the assistance of partner organizations.
- Action networks represent the most robust type of intergovernmental network. In this format, the regions that are members collaborate to develop a collective action plan based on their different proportions and capabilities.

2.3. Organizational capacity

The significance of capacity is evident in the three Disaster Risk Reduction conferences held in Yokohama in 1994, Kobe in 2005, and most recently in Sendai in 2015. The three conferences emphasized that capacity development is a crucial strategy for mitigating the effects of disasters (Hagelsteen and Burke, 2016). As highlighted in the literature, this capacity development plays a crucial role in engaging multiple stakeholders and levels of decision-making (Scott and Few, 2016).

Capacity is an exclusive notion that refers to the process and outcome of something. It is dynamic and multifaceted, reflecting progress or regression (Brown, 2001). Capacity, as defined by the United Nations Development Programme (UNDP), refers to the development of the skills and abilities of individuals, organizations, and communities to effectively carry out tasks, solve issues, and accomplish objectives via taking ownership, making choices, and relying on oneself (World Bank, 2005). Capacity refers to the capability of individuals, organizations, and society to handle their affairs effectively. On the other hand, capacity development is the procedure through which individuals, organizations, and society enhance, fortify, establish, adjust, and maintain their capacity over time (Brinkerhoff and Morgan, 2010).

Horton (2003) explains that capacity building is a continuous process in which an organization enhances its capability to develop and accomplish significant objectives, including strengthening operational capacity and adaptive capacity. The organization's capacity development is achieved by its own volition and utilizing its resources, which can be supplemented with external resources and support. Horton (2003) categorizes two fundamental capacity factors essential for organizational performance: (1) resources, encompassing conventional 'hard' capacities like infrastructure, technology, finance, and personnel. Organizational resources encompass persons, facilities, vehicles, equipment, and readily available cash. Also, management is responsible for establishing conditions to define and accomplish suitable goals. Managerial activities encompass a range of tasks such as strategic planning, goal formulation, delegation of responsibility, leadership and guidance, resource allocation, motivation, and supervision of staff members. Additionally, managers are responsible for maintaining connections with stakeholders. The many actions can be categorized into three sections: strategic leadership, management programs and procedures, and networks and partnerships.

3. Methodology

This study focuses on the development of products through research. Specifically, it aims to evaluate the intergovernmental networks and local government capacity in disaster management in North Sumatra. The evaluation will be conducted using the CIPP model, which consists of four components: context (evaluating the context), input (evaluating the input), process (evaluating the process), and product (evaluating the results). This model is described by Stufflebeam and Shinkfield (2007). The development model to be implemented adheres to the development process outlined by Meredith and Walter (1996), which asserts that an evaluation process can be considered effective if it incorporates the criteria of usefulness, timeliness, feasibility, appropriateness, and accuracy. The standards are classified into thirty categories across four evaluation domains.

In addition, researchers performed a meta-analysis of the application of disaster management methods in North Sumatra. To conduct quantitative data analysis, researchers assigned a score to each employee observation using four categories of evaluation standards: utility, feasibility, propriety, and accuracy. These standards are outlined in 30 specific criteria as defined by the Joint Committee in 1994, as cited by Nevo (2013). The formula used for this analysis is as follows:

$$\text{Value} = \frac{\text{score obtained}}{\text{Maximum score}} \times 100$$

To determine the value category, use the following method:

≤ 50 = very low/very less

51–59 = low/less

60–69 = simply

70–79 = high/good

≥ 80 = very high/very good

This study employs a mixed design research strategy, where the qualitative approach is the dominant method and the quantitative approach is the less prevalent method. Creswell and Poth (2016) propose that mixed method research is an approach to study that integrates qualitative and quantitative methods. The study primarily employs a qualitative method, with the current data being utilized as supplementary information to the data gathered through the quantitative approach.

The research data is derived from comprehensive interviews with government personnel, scrutiny of official government records, and firsthand observations at several research sites. Government officials responsible for decentralization and disaster management in Indonesia were interviewed extensively. The focus was on intergovernmental networks and the organizational capacity at the provincial level, which included representatives from the National Disaster Management Agency. Additionally, officials from regional governments, including regency and city levels, were included in the interviews. We conducted interviews with local government officials responsible for disaster management. This research focuses on regional governments because of their extensive autonomous jurisdiction within the framework of Indonesian decentralization (Firman, 2010). Furthermore, within the realm of

disaster management, it is the local governments that primarily assume the duty in the event of a disaster (Djalante et al., 2012).

The selected location of the case studies in this study was not chosen randomly but by information-oriented sampling. Two criteria were set for case selection:

- Each district/city regional government was selected based on distinct natural hazard characteristics, with a specific focus on the analysis center of the BPBD in North Sumatra Province. In Indonesia, decentralization offers regional governments extensive opportunities to develop their regions based on their strengths and available prospects. In addition, local governments develop strategies to address current vulnerabilities and risks, such as prospective natural disasters (Ahmed and Iqbal, 2009). This particular form of natural calamity serves as a fundamental basis for local authorities in the establishment of disaster management frameworks and regulations.
- Level 2 local governments are chosen according to population criteria. Metropolises with substantial populations are anticipated to possess the capacity to establish a more organized and efficient disaster management framework. Thus, we employed population size as a determining factor. The Indonesian Government classifies cities in Indonesia into four categories based on population: metropolitan (with a population exceeding 1 million), large urban (with a population ranging from 500,000 to 1 million), medium urban (with a population ranging from 100,000 to 500,000), and small urban (with a population of less than 100,000). We selected cities that had seen diverse categories of calamities and varying population magnitudes. We selected four municipalities, specifically Medan, Deliserdang, Karo, and Dairi, as our case study settings. Medan is an urban area that is susceptible to frequent flooding. Deli Serdang is a densely populated metropolis that is susceptible to frequent occurrences of both floods and tornadoes. Karo is a metropolitan city of moderate size that frequently encounters volcanic outbursts. Dairi is a moderate-sized urban region that is susceptible to landslides.

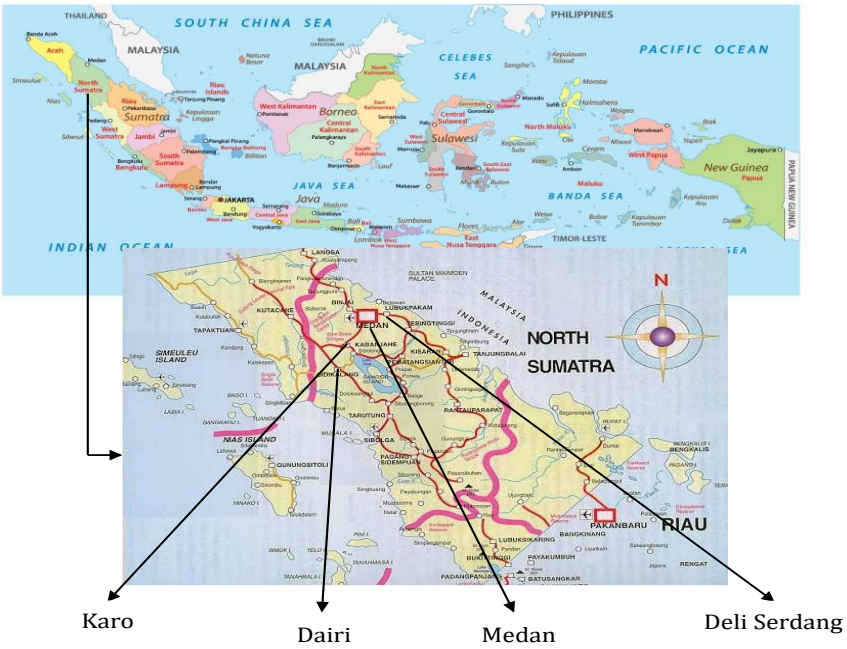

Figure 2. Research location.

The location of this research was carried out in North Sumatra Province with several districts and cities, including Deli Serdang Regency, Karo Regency, Dairi Regency, and Medan City as shown in **Figure 2**. Before delving into intergovernmental networks and local government capacity in crisis management, this study examined the influence of leadership variables, internal communication, and staff performance. The researchers conducted a study to investigate the impact of leadership and internal communication on employee performance in the specific context of disaster management in North Sumatra Province. The goal was to gain valuable insights that can be used to develop more effective strategies and policies for dealing with complex and unpredictable natural disasters. The study presents a development framework, as seen in the accompanying figure.

To enhance its functionality in problem-solving, an operational definition of variables is established based on the aforementioned framework, which can be seen in **Table 3**:

Table 3. Operational definition.

Variable	Operational defenition variable	Indicator variables	Measurements
Leadership styles (*X*1)	Leaders' capacity to effectively advise and direct their subordinates through certain behaviours	Measured using Sheldrake's theory (Lakmiwati, 2020) with indicators: • Planning • Organizing • Commanding • Coordination • Control	Indicators are assessed by a Likert scale questionnaire ranging from 1 to 5: • 1 representing "Strongly Disagree" • 2 representing "Disagree" • 3 representing "Moderately Agree" • 4 representing "Agree" • 5 representing "Strongly Agree"

Table 3. (*Continued)*.

Variable	Operational defenition variable	Indicator variables	Measurements
Internal communication (*X*2)	Internal communication refers to the transmission and reception of messages that occur within the confines of an organisation.	Utilising the theoretical framework developed by Katz and Kahn (Reny, 2019), the measurement of internal communication consists of five indicators: • Vertical communication: • Instruction • Work rationale • Procedures and implementation • Feedback • Doctrine or purpose • Horizontal Communication • Work task conditions • Building a social support system • Building information togetherness • Problem solving • Conflict solution	Indicators are assessed by a Likert scale questionnaire ranging from 1 to 5: • 1 representing “Strongly Disagree” • 2 representing “Disagree” • 3 representing “Moderately Agree” • 4 representing “Agree” • 5 representing “Strongly Agree”
Employee’s performance (*Y*)	Performance is a quantitative and qualitative result	Assessed utilising performance evaluation criteria as outlined by Lenzo, Paola et al. (2017), which consist of six indicators: • Quality • Quantity (amount) • Time (Time period) • Cost emphasis • Supervision • Employee relations	Indicators are assessed by a Likert scale questionnaire ranging from 1 to 5: • 1 representing “Strongly Disagree” • 2 representing “Disagree” • 3 representing “Moderately Agree” • 4 representing “Agree” • 5 representing “Strongly Agree”

Source: Data processed by researchers, 2024.

The hypothesis in this investigation is as follows:

- Hypothesis 1
  - (Ho): There is no statistically significant correlation between leadership and employee performance at BPBD North Sumatra.
  - (Ha): There is a strong and meaningful correlation between leadership and employee performance at BPBD North Sumatra.
- Hypothesis 2
  - (Ho): There is no statistically significant positive correlation between internal communication and employee performance at BPBD North Sumatra.
  - (Ha): There is a strong and meaningful correlation between the communication climate and employee performance at BPBD North Sumatra.
- Hypothesis 3
  - (Ho): There is no discernible and statistically significant correlation between leadership and internal communication with employee performance at BPBD North Sumatra.
  - (Ha): Leadership and internal communication have a strong and meaningful impact on staff performance at BPBD North Sumatra.

The research conducted in the production of this study is quantitative research using the Associative research method. This method establishes the association between two or more variables (Sugiyono, 2017). The study population consisted of two hundred and twenty-four (224) individuals who were all public servants (PNS) at BPBD North Sumatra. The sampling approach employed was the Probability sample, specifically the Strata Sample method, also known as Stratified Sampling.

Stratified sampling approaches were employed using a proportionate sample type to ensure that every BPBD North Sumatra Civil Servant (PNS) had an equal chance of being selected as a respondent from each section of the work unit (Siregar, 2013). The sample distribution in this study was determined using the following formula:

$$n = \frac{N}{1 + Ne^2}$$

Description: n = sample, N = population, e = he used error rate is expected to be 5%.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{224}{1 + 224(5\%)^2}$$

$$n = \frac{224}{1 + 224(0.05)^2}$$

$$n = \frac{224}{1.56}$$

$$n = 143.5$$

The result from the calculation above is 143.5, which is rounded up to 144. The sample size consisted of 144 individuals who served as respondents. The distributed questionnaire is closed-ended, consisting of multiple-choice questions. The respondents' replies are assigned a value or score using a Likert scale. Sugiyono (2003) defines the Likert scale as a tool for quantifying the attitudes, views, and perceptions of individuals or groups about social phenomena. This researcher employs five distinct sorts of responses, which are as follows (**Table 4**):

Table 4. Likert scale.

No.	Questions	Rated
1.	Strongly agreed	5
2.	Agree	4
3.	Less than agree	3
4.	Disagree	2
5.	Strongly disagree	1

Source: Data processed by researchers, 2024.

To ascertain the reliability of the measuring instrument employed in this study, the researcher utilizes two distinct forms of testing, namely: (1) The validity test assesses the degree to which a measuring device is capable of accurately measuring

the intended variable (Siregar, 2013). The technique employed to determine the instrument's validity is the calculation of the moment product correlation between the score of each question item and the overall score. (2) A reliability test aims to assess the degree to which measurement findings remain consistent when the same symptoms are measured multiple times using the same measuring instrument. Instrument dependability can be assessed through external or internal testing (Siregar, 2013). The instrument's reliability in this study was assessed using Cronbach's alpha (α) coefficient model.

The methodology employed in this study utilizes a regression model for data analysis. The research underwent rigorous examination using multiple statistical tests. Before hypothesis testing, a preliminary exam will be conducted to identify any departures from classical assumptions. According to classical assumptions, three specific tests need to be conducted. These tests include the Normality Test, which determines whether the regression model, dependent variable, and independent variable follow a normal distribution. The Multicollinearity Test is used to determine if there is a correlation between the independent variables in the regression model. Lastly, the Heteroscedasticity Test is performed to assess whether there is a variation in the residuals of different observations in the regression model. Heteroscedasticity refers to the condition where the variance of the residuals between observations varies, while homoscedasticity refers to the condition where the variance remains constant.

In addition, the SPSS for Windows 22.0 software program was utilized to conduct multiple linear regression analysis in this research. The coefficient of determination is a numerical value that quantifies the extent to which one or more independent variables contribute to the dependent variable (Siregar, 2013). This assessment establishes how much the independent variables, specifically leadership style ($X1$) and internal communication ($X2$), impact employee performance. To calculate the coefficient of determination, use the following formula: The formula to calculate the coefficient of determination is by squaring the value of r and then multiplying it by 100%. The F test is conducted to determine the collective impact of the independent factors on the dependent variable. This F test examines the simultaneous influence of the independent variables of leadership ($X1$) and internal communication ($X2$) on employee performance (Y).

The F test in question follows the testing rules outlined by Siregar (2013). If the value of Fcount is less than or equal to the value of Ftable, then the null hypothesis (Ho) is accepted. If the value of Fcount is greater than the value of Ftable, then the null hypothesis (Ho) is rejected. During the final stage, the *t*-test is conducted to determine the impact of each independent variable on the dependent variable. This test involves comparing the computed t value for each independent variable with the t table value at a 5% significance level ($\alpha = 0.05$). Based on the estimated t value, it may be determined that the independent variable has the most impact on influencing the dependent variable (Siregar, 2013). The *t*-test in question follows the following testing rules: If the value of "thing" is between -ttable and ttable, then the null hypothesis (Ho) is accepted. If the observed value of the test statistic is greater than the critical value, then the null hypothesis is rejected.

4. Results and discussions

4.1. Reforming disaster management in North Sumatra: Examining potential opportunities and challenges

4.1.1. Regulation

The disaster management law (DML), implemented in 2007, outlines the obligations and anticipations of national and regional governments, the readiness of communities, and the provision of emergency aid in times of calamities (Rao, 2013). It additionally governs the duties and liabilities of the community and donor organizations, as well as the private sector. Historically, the community has been perceived as a passive recipient of aid and has had less involvement in disaster management, particularly during the pre-disaster stage. The DML facilitated strong community participation in disaster management. In addition, the DML dealt with the issue of catastrophe financing, which is now the joint responsibility of both national and municipal governments. This legislation mandated all parties to prioritize and enhance disaster management systems, ensuring their integration into the state administration system (Rombach et al., 2014).

The delegation of authority has prompted local governments to establish disaster management systems tailored to their unique natural hazard characteristics and vulnerability situations. Local governments must also actively enhance their governance capacities to maintain a balanced level of risk. The disaster management law (DML) has emerged as a fundamental framework for local governments to establish laws for effectively implementing disaster management locally (Anantasari et al., 2017). BPBD is a regional government institution under the Ministry of Home Affairs (according to an interview with the Head of North Sumatra BPBD on 29 January 2024). Nevertheless, it is imperative to have laws from BNPB that offer precise technical assistance on disaster-related matters. Disaster management regulations at the regional level must adhere to the regulations set by the Ministry of Home Affairs, as this ministry can authorize such regulations. Simultaneously, local legislation about disaster management structures must adhere to the criteria set by BNPB. The divergent approaches frequently result in incongruities in disaster management policy (interview with the Head of Medan City BPBD, 13 February 2016).

4.1.2. Institutional establishment

Before 2007, the Indonesian government had established disaster management organizations by Presidential Decree No. 3 (2001), most notably the National Coordinating Agency for Disaster Management and Refugees (BAKORNAS-PB). The BAKORNAS-PB was an ad hoc institution tasked with providing emergency response to a disaster. It reported directly to the President and was headed by the Vice President (Lassa, 2011). Following the founding of BAKORNAS-PB at the national level, a Disaster Management Coordinator Unit (SATKORLAK) was established at the provincial level, headed by a provincial governor. Additionally, an Implementing Unit (SATLAK) was formed at the municipality level, led by a mayor. In 2007, the government strengthened disaster management institutions by implementing the disaster management law (DML). This legislation required the creation of the BNPB

to replace the BAKORNAS-PB, and BPBDs to take over from SATKORLAKs at the provincial level (Putra and Matsuyuki, 2019) (refer to **Table 5**).

Table 5. Comparison of disaster management institutions before and after decentralization.

Content	Before decentralization	After decentralization
Organization	The National Coordinating Agency for Disaster Management and Refugees (BAKORNAS-PB) (national) The Disaster Management Coordinator Unit (SATKORLAK) (provincial) Implementing Unit SATLAK (city/regency)	The National Disaster Management Agency (BNPB) (national) The Regional Disaster Management Agency (BPBD) (provincial and city/regency)
Head of the institution	Vice president (national) Governor (provincial) Mayor/Regent (city/regency)	Chief of BNPB (national) Chief of BPBD (provincial and city/regency)
Institution status	Ad-hoc agency	Permanent agency
Function	Coordination across sectors in the implementation of emergency response	Coordination, command, and implementation of disaster management (pre-disaster, emergency response, and post-disaster)

The transition from BAKORNAS-PB to BNPB at the national level is mostly a result of decentralization. The main objective of the DML was to establish a long-lasting and more robust institution for disaster management following the Indian earthquake and tsunami in 2004. Decentralization involves the delegation of power to the local level. In an organizational context, this means that institutions at the central level are minimally impacted. However, the transition from SATKORLAK and SATLAK to BPBD at the local level mainly stems from decentralization.

To ensure adequate disaster management at all phases, it is necessary to develop permanent and robust institutions at the provincial and municipal levels by decentralizing the authority of disaster management from the central government. When considering the institutional frameworks, no notable alteration was observed in the transition from SATKORLAK and SATLAK to BPBDs at the local level. The link between BAKORNAS-PB, SATKORLAK, and SATLAK, as well as between the BNPB and the BPBD, is highly similar. Put, there is no clear and direct hierarchical relationship between institutions operating at the national and local levels. The BNPB has broader jurisdiction than the BAKORNAS-PB in terms of its authority. However, in terms of its ability to exert authority, the BAKORNAS-PB had its strengths. During emergency relief efforts, the BAKORNAS-PB demonstrated greater efficiency compared to other ministries due to the higher bureaucratic position held by its chairman, the Vice President, about other ministers (interview with the head of the BNPB North Sumatra, 29 January 2024).

At the local level, SATKORLAKs and SATLAKs enjoyed comparable benefits to the BAKORNAS-PB due to their leadership by governors and mayors who held higher administrative positions than other local institution chiefs. On the other hand, the leaders of the BNPB and provincial and local BPBDs are government officials, which means their ability to exert influence over other ministries and institutions is comparatively limited. Conversely, according to the disaster management law (DML), the National Disaster Management Agency (BNPB) and Regional Disaster Management Agencies (BPBDs) have the authority to carry out disaster management tasks in every stage of a disaster (before, during, and after), enabling them to fulfill a

broader disaster management role. In addition, with regard to financial allocation, these institutions are considered permanent and are provided with an annual budget to carry out their programs during all stages of a disaster.

We have found several distinct concerns about institutional features through our discussions with local officials in the four selected places for our case study. Nevertheless, being a nascent organization, the BPBD has been entrusted with guiding and coordinating other agencies within the local disaster management system. Regrettably, this duty lacks sufficient allocation of resources, including financial and human resources. The head of the Karo District BPBD explained that in 2014, after the eruption of Mount Sinabung, the BPBD was a newly established institution. Due to this, they could not hire skilled personnel from other institutions because they did not have permission from the original institution (5 February 2024). District/municipality BPBDs face challenges in creating annual work plans due to insufficient data on catastrophe potential and susceptibility, resulting in difficulty in budget allocation.

The primary challenges are insufficient data and knowledge regarding the region's status and the absence of historical records documenting natural disasters (Putra and Matsuyuki, 2019). Furthermore, the Head of BPBD, Deliserdang, acknowledged that the limited budget hampers the BPBD's ability to hire qualified personnel from the existing pool of professionals (12 February 2024). BPBDs frequently encounter challenges in developing disaster management networks that involve non-government entities, including NGOs, funding organizations, and academia. The establishment of BPBD Deliserdang in 2015 was prompted by the district's susceptibility to several natural catastrophes, including floods, landslides, strong winds, and the proximity to Mount Merapi, which shares a border with Karo Regency. The director of BPBD, Dairi, contended that the organization encountered difficulties forming partnerships with other entities due to the absence of clear protocols regulating collaborative procedures (19 February 2024).

4.1.3. Planning

Before decentralization, Indonesia lacked a formal planning document for disaster management because of the prevailing belief that disasters were unpredictable and could not be effectively prepared for or managed. Previously, disaster management activities primarily focused on immediate reaction actions, such as organizing the delivery of supplies and managing the influx of refugees. Before decentralization, BAKORNAS-PB coordinated disaster management efforts at the national level, with a specific focus on emergency response activities (refer to **Table 6**). The implementation of disaster management does not rely on disaster risk assessment but instead on the severity of the disaster's impact (interview with the Head of North Sumatra BPBD, 29 January 2024). In addition, local governments at the regional level are required to undertake emergency operations by policies developed at the national level.

Significantly, these plans delineate the responsibilities of everyone involved at every phase of the catastrophe. Nevertheless, this plan is not self-sufficient. It is necessary to integrate national, provincial, city, and regency disaster management plans with other strategic plans, such as national, provincial, and municipal

development plans and spatial planning plans. This integration has numerous advantages, including guaranteeing the execution of government initiatives in disaster management over multiple years and ensuring that land use planning considers hazardous and sensitive conditions.

Table 6. Comparison of the disaster management planning process before and after the disaster management law.

Content	Before DML	After DML
Plan	No plan	National disaster management plan (RENAS-PB), provincial disaster management plan, city/regency disaster management plan (RPB)
Planning coordinating agency	BAKORNAS-PB (national)	BNPB (national) and BPDB (Provincial dan city/regency)
Content plan	Emergency activities	Pre disaster, emergency response, post-disaster planning
Integrated with another plan	No	Yes (integrated with development and spatial plans)

Nevertheless, according to our interviews with local government officials, most local governments have yet to incorporate the RPB into their development or spatial plans. These interviews were conducted with the Secretary of BAPPELITBANG North Sumatra and BAPPEDA Medan on 4 March 2024, and with BPBD Karo and Dairi on 8 March 2024. The absence of clear instructions on how to include plans and technical guidance are the primary factors contributing to the tendency of RPBs to remain separate documents. RENAS-PB and RPB offer comprehensive strategies that serve as a benchmark for disaster management across all government levels (interview with BAPPEDA Deli Serdang, 4 March 2024).

4.1.4. Intergovernmental networks

Intergovernmental networks necessitate the participants to implement inside strategies, including game management and outward strategies, which pertain to network structure. The establishment of mutual awareness regarding the need for inter-regional cooperation is achieved through implementing a mechanism (game management). This process is complemented by implementing an outward strategy (network structure), which includes mutually agreed-upon norms or arrangements within the network. Through the established agreement, the current participants can collaboratively develop strategies for success, allocate roles, determine benefits, and outline the duties of each participating party. Equally crucial is how monitoring and assessment are conducted to ensure that the networks constructed stay on course and maintain relevance for all parties involved (Kirkpatrick and Kirkpatrick, 2016).

The Medan City Government has executed the process of network structuring in inter-regional cooperation with the Deli Serdang Regency Government, which can be seen in **Table 7**. This collaboration encompasses the territorial limits of Medan and Deli Serdang, focusing on managing natural disasters, fire prevention, flood control, waste management and disposal, and other relevant issues tailored to the specific needs of each community. It is important to emphasize that all activities will comply with the relevant regulations (interview with BPBD Deli Serdang, 4 March 2024). The inter-regional cooperation agreement enables the effective and efficient implementation of agreed-upon concrete cooperation programs while upholding the principles of equality and mutual benefit as outlined in Government Regulation (PP) No.28 of 2018 and Minister of Home Affairs Regulation (Permendagri) No.22 of 2020.

Moreover, the Chief of BPBD Medan City remarked that the progress of Medan City is intricately linked to Deli Serdang.

Table 7. Network structuring process in intergovernmental networks.

Level/strategy	Perception/interpretation	Actors/facilities	Institutions/norms
Game management	Coventating: Analyzing the similarities and variances in how actors perceive things, and finding ways to synchronize their objectives.	Selective (de) activation: Mobilize power of actors who are poor resources and mobilize the role of resource dominating actors.	Aranging: Build, look after, and changerelationship format short-term the one that can push interaction in groups.
Network structuring	Reframing: Changing the perceptions of actors in the network that will frame actors in determining what values are prioritized.	Network (de) activation: Mobilize power of actors who are poor resources and mobilize the role of resource dominating actors.	Reconstitutionalism: Change policy, rules and resource in network in a way fundamentals.

Source: Teisman and Klijn, 2000.

It is essential to achieve sustainable development across regions rather than solely focusing on building in Medan City or Deli Serdang, as this approach would not effectively address the problem. Hence, resolving the floods in Medan City and Deli Serdang requires collaboration between the Medan City and Deli Serdang Regency Government, which is an exceptional endeavor. As an illustration, consider the Lau Simeme Dam, which is currently being built. In Medan City, the dam serves a purpose that exceeds 40 percent, and it has the potential to mitigate flooding in the city effectively. This collaboration agreement guarantees that the Medan City Government will be legally responsible for developing infrastructure in the Deli Serdang area in 2023/2024. The Medan City Public Works Office has planned to undertake road-building projects in the Deli Serdang region. These projects will focus on five specific road sites in poor condition. The construction work is scheduled to commence on 13 February 2024.

The research focuses on the study areas of Dairi Regency and Karo Regency, where inter-regional collaboration is also conducted. According to interviews with the BPBD of Dairi Regency, Dairi Regency is susceptible to landslides, particularly following significant rainfall. The Dairi Regency administration collaborates with BPBD and relevant authorities to delineate areas susceptible to landslides, construct retaining walls, and educate the community about indicators of landslide hazards and the necessary procedures for evacuation. Dairi Regency is highly susceptible to forest fires, particularly in regions with desiccated vegetation. The Dairi Regency Government is collaborating with the TNI, Polri, and other relevant authorities to carry out forest patrols, raise awareness about the hazards of forest fires, and provide training to the community on methods of preventing and managing forest fires (8 March 2024).

In addition, researchers observed the collaboration between the Dairi Regency Government and the Karo Regency Government. These two regions established a unified disaster management team of many relevant organizations, including BPBD, Social Service, Health Service, Police, TNI, and volunteers. This team is responsible for strategizing, organizing, and executing disaster management initiatives in both districts. The Dairi and Karo Regency governments collaborated to create maps of places in their territories susceptible to disasters. This mapping facilitates the process of evacuation planning, catastrophe risk management, and the creation of

infrastructure for disaster mitigation. During a crisis, the Dairi Regency Government and the Karo Regency Government collaborate in emergency management by offering aid to one another. This assistance includes establishing refugee camps, providing logistical support, and delivering healthcare services to those affected by the disaster. During the Sinabung volcanic eruption, the Karo District Government collaborated with the Dairi District Government, the Deli Serdang District Government, and the Central Government, particularly BNPB, to secure supplementary aid in managing this calamity. Every area and the National Disaster Handling Agency (BNPB) dispatched a contingent of specialists and provided logistical support to aid in handling the disaster in Karo Regency.

Overall, the establishment of the intergovernmental network for disaster management in North Sumatra may be classified into two components: facilitating factors and hindering aspects. The disaster risk reduction framework is built upon managing disaster management efforts, focusing on factors that systematically and comprehensively mitigate risk before and during a disaster. This framework applies to all districts and cities and emphasizes planned, coordinated, and integrated actions. During the post-disaster phase, it is crucial to determine the individuals and organizations involved and their respective responsibilities in North Sumatra Province. This includes local governments, civil society organizations, academia, the corporate sector, and the media. Consequently, the primary objective of disaster risk reduction endeavors is to execute a complete disaster management approach by intervening in the factors of hazard, vulnerability, and capability between the provincial government and district/city governments (Interview with BPBD Secretary, 29 January 2024).

The absence of efficient coordination and collaboration in crisis management hinders the implementation of the intergovernmental network in North Sumatra Province, resulting in each unit working separately. We have devised a comprehensive strategy for disaster management that encompasses all sectors of emergency management and post-disaster management. This strategy was developed through collaboration with all relevant stakeholders, as stated in the interview with the Head of BPBD North Sumatra on (29 January 2024). Strategies and policy directions are formed based on strategic issues. The elaboration of strategic issues is to formulate policy orientations that will enhance the Regional Resilience Index (IKD) and mitigate the Disaster Risk Index (IRB). Disaster Risk Reduction is a collaborative program involving several regional stakeholders, including government, corporate, and community representatives. It is designed to address disaster management policy and demonstrate a shared commitment to reducing disaster risks in North Sumatra Province. The action plan is produced by referencing specific strategic concerns identified and analyzed from the primary difficulties that have been identified.

Establishing intergovernmental networks is not just the responsibility of the government. It necessitates the active involvement of all parties involved in crisis management, with each player sharing specific tasks. The participation of academics, community organizations, commercial institutions, and the media is necessary for Disaster Risk Reduction Programs and Action Plans, as they now heavily rely on government participation. The researchers analyzed the Network Structuring process table in Intergovernmental Networks to identify the specific roles of the parties involved in disaster management in North Sumatra (**Table 8**).

Table 8. The role of parties in disaster management in North Sumatra Provincial Government, Medan City Government, Deli Serdang Regency Government, Dairi Regency Government, Karo Regency Government.

Elements	Pre-disaster role	Role in disaster emergency response	Role in post-disaster
Business	1) Occupational safety and health training. 2) Mainstreaming disaster risk reduction in the company's business processes. 3) PHBS campaign 4) Education on community disaster risk management in disaster-prone areas. 5) Structural mitigation to manage disaster risk in the Company's operational areas 6) Reforestation in forest areas and green belts in coastal areas	1) Fulfilling needs for food, clean water and sanitation, and shelter 2) Health services, education; 3) Meeting the basic needs of refugees 4) Health services	1) Recovery of the community's economy 2) Provision of temporary housing 3) Development of educational, health, 4) Construction of housing for the community 5) Assistance to productive business groups with grant assistance for capital and production facilities 6) Construction of residential clean water networks
University	1) Develop disaster research 2) Socialization of disaster-prone areas and disaster risks 3) Development of Thematic KKN for village resilience	1) Search, rescue, emergency assistance	1) Assessment of recovery needs 2) Recovery of the community's economy 3) Construction of education and health facilities 4) Construction of housing for the community 5) Assistance to productive business groups with grant assistance for capital and production facilities 6) Construction of residential clean water networks
Community Organizations	1) Training of disaster management volunteers 2) Development of disaster prepared villages/villages 3) PHBS Campaign 4) Education on disaster risk management for communities in disaster-prone areas 5) Preparation of officers, equipment and logistics 6) Reforestation in forest areas and green belts in coastal areas	1) Search, rescue, emergency assistance 2) Meeting the basic needs of refugees 3) Health Services 4) Psychosocial services 5) Meeting the basic needs of refugees 6) Health Services	1) Recovery of the community's economy 2) Provision of temporary housing 3) Construction of education and health facilities 4) Construction of housing for the community 5) Assistance to productive business groups with grant assistance 6) Construction of residential clean water networks
Media	1) Socialization of disaster-prone areas and disaster risks 2) Educate communities on disaster risk management in disaster-prone areas	1) Early warning news 2) Reporting on developments in disaster threats 3) Notification to increase alertness for evacuation readiness 4) Reporting on disaster emergency management	1) Reporting on the post-disaster recovery process 2) Reporting on post-disaster recovery achievements

Source: FGD and Data Analysis, 2024.

4.2. Capacity of local government in disaster management

Researchers utilized Horton (2003) organizational capacity theory to examine the regional government's ability to manage disasters in North Sumatra. Horton defined organizational capacity as the whole potential of an organization to execute its actions. This refers to the organization's ability to effectively utilize its current capabilities and resources to achieve its goals and satisfy the demands of stakeholders. The combination of resource capacity and management capacity constitutes the total organizational capacity.

4.2.1. Resource

The North Sumatra Province BPBD, Medan City BPBD, Deli Serdang Regency BPBD, Dairi Regency BPBD, and Karo Regency BPBD, which are at the forefront of disaster management, encounter numerous deficiencies. The current staffing levels in each BPBD are insufficient. This occurrence is undeniably lamentable since it will harm organizational productivity and lead to a decline in performance. According to the interview data, the primary reason is a prevailing belief that BPBD (Disaster Management Agency) only operates during disasters, negating the need for extra personnel. Furthermore, higher education institutions in Indonesia do not provide a significant amount of formal instruction explicitly focused on catastrophes. In a shortfall of civil servants in BPBD, personnel are typically sourced from other government entities such as Satpol PP, regional fire departments, and similar agencies to fulfill staffing requirements. This is the rationale behind the higher proportion of contract employees, which accounts for around 60% of the total workforce in each BPBD agency. Based on this issue, it may be inferred that each agency's competence and number of human resources are insufficient for effectively implementing disaster management initiatives.

The infrastructure supporting disaster management in Dairi Regency and Karo Regency is insufficient to meet the needs of these two districts. This is due to the fact that this region is undergoing development. Consequently, the facilities, infrastructure, and accessibility in this area are significantly worse than those in Medan City and Deli Serdang Regency. The geographical dispersion of the area's sub-districts hinders growth. Presently, numerous communities exist in these two regions that pose challenges in terms of accessibility, particularly those situated on the periphery of the territory. Accessing a residential sector in a village is time-consuming due to the substandard road conditions. The administration is facing challenges in accessing the disaster-stricken villages due to their remote position, necessitating the usage of a hilly route with limited accessibility. This circumstance exacerbates emergency response and logistics distribution efficiency in a disaster. There has been a noticeable improvement regarding the infrastructure and facilities controlled by BPBD. Due to the increased occurrence of flood, landslide, and volcanic eruption disasters in North Sumatra, the regional government has received significant support, particularly from the central government. Continuous enhancements and additions are being made to all technologies that facilitate catastrophe management.

All the domains examined in this study have effectively employed technology, such as utilizing drones to evaluate disaster occurrences geographically by flying them into the air after a disaster. This practice can be adopted by BPBD. Within the Regional Revenue and Expenditure Budget (APBD), the regional government does not allocate dedicated funding for catastrophes, except the budget reserved in the BPBD budget. According to the findings of the interviews, the allocated money for BPBD is still inadequate, as various disaster management programs of BPBD are not funded by the current budget. While the federal government has provided dedicated cash for catastrophes, this does not absolve local governments from the responsibility of allocating separate budgets for disaster management. Notably, the finances provided by the central government for disaster management in Indonesia are quite small

compared to the numerous potential disasters across the country (Djalante and Garschagen, 2017).

4.2.2. Management

Horton (2003) categorizes the discussion on management variables into three indicators: strategic leadership, program and process management, and networks and partnerships. Overall, the leaders of BPBDs in the selected regions in this study possess a comprehensive understanding of organizational management and enhancement, particularly in decision-making, where the top executive consistently includes employees. However, rapidly changing the leadership of offices within the province government and district/city administrations, including BPBD itself, will inevitably impact the agency's effectiveness. Furthermore, this issue is exacerbated by the leader's background, which does not align with the agency's mandate. The BPBD, responsible for managing disaster affairs, should be headed by an individual with a strong academic background and extensive disaster expertise.

Disaster risk studies serve as the foundation for choosing solutions that are deemed effective in mitigating disaster risk. The disaster risk assessment maps in North Sumatra Province cover various areas of research, including flood, extreme weather, flash flood, extreme wave, earthquake, forest fire, land, drought, Sinabung volcanic eruption, Sibual-Buali volcanic eruption, Sorik Marapi volcanic eruption, Sibayak volcanic eruption, Pusuk Buhit volcanic eruption, landslide, tsunami, technology failure, epidemic and disease outbreak, liquefaction, and COVID-19. This is crucial for identifying, clarifying, and assessing disaster risks.

BPBD Karo Regency, in collaboration with relevant supporting agencies, is responsible for developing construction regulations and overseeing the implementation of earthquake-resistant building standards suitable for the specific characteristics of the Karo Regency area. Establish guidelines for constructing earthquake-resistant buildings, implement monitoring systems for buildings at risk of earthquake damage, and contribute to the Spatial and Regional Planning (RTRW) to ensure alignment with disaster risk management. The action above has been specified in the following regional regulations: North Sumatra Province Regional Regulation Number 2 of 2017, Medan City Regional Regulation Number 1 of 2022, Deli Serdang Regency Regional Regulation Number 1 of 2021, Karo Regency Regional Regulation Number 4 of 2022, and Dairi Regency Regional Regulation Number 7 of 2014. Furthermore, the Deli Serdang Regency administration and the Medan City administration have been progressively enhancing various public infrastructures to facilitate the execution of disaster management in the region, alongside the establishment of earthquake-resistant building standards. These public amenities will indirectly enhance the overall performance of the Regional Government in undertaking disaster management.

Similarly, in mitigating susceptibility to flood calamities. During structural mitigation, the BPBD collaborates with relevant supporting agencies to develop regional RTRW regulations considering the risk of flood disasters. The indicator of success is the presence of regional regulations that specifically address flood mitigation efforts in the Medan City and Deli Serdang Regency areas. The construction of evacuation routes in Karo and Dairi Regencies has been implemented

by infrastructure development planning, aligning with the development of regional spatial planning focused on disaster mitigation. Evacuation routes are being constructed in community settlements susceptible to landslides, forest fires, and volcanic eruptions. These routes are designed to offer at least two alternate paths to ensure smooth evacuation without any congestion. Evacuation routes are essential in disaster-prone locations to ensure that both residents and migrants are aware of where to go when a crisis strikes. Consequently, each evacuation route should be furnished with directing signs. Following the provision of disaster preparedness education by BPBD, the adequacy of supporting infrastructure for disaster management was subsequently assessed through training and simulations.

In order to enhance community readiness for catastrophes, the BPBD of North Sumatra Province has established a disaster resilient village. disaster resilient villages refer to villages that possess the autonomous capacity to adjust and confront calamities, and can promptly recover from the adverse consequences of such disasters. The Regional Government is taking further measures to mitigate the risks of disasters by relocating villages situated in sensitive areas. Following the eruption of the Sinabung volcano, the government has systematically evacuated multiple community settlements to more secure locations.

Given the magnitude and growing complexity of disaster-related issues that need to be addressed, it is important to acknowledge that managing such matters requires collaboration among multiple agencies. The network and relationship elements play a crucial role in enhancing organizational capacity. Moreover, considering the identified deficiencies in the regional government BPBDs, particularly in terms of manpower and financial resources, as previously discussed, it is anticipated that establishing networks and fostering relationships can serve as a viable solution to collectively address the encountered challenges. Partnerships integrating many sectors, such as regional organizations, the private sector, and the community, facilitate the establishment of networks and interactions.

4.3. The effect of leadership style and internal communication on employee performance

The data utilised to assess the validity of the instrument in this study was obtained from 144 employees of BPBD North Sumatra, selected based on their respective work units. The number of questions in the form of statements for the three research variables, namely leadership style ($X1$), internal communication ($X2$), and employee performance (Y), is 39.

This validity test is conducted using the product-moment correlation method, specifically by computing the correlation between the scores of each question item and the total score (Siregar, 2013). The criteria employed are either valid or invalid in ascertaining the validity or invalidity of a question item. If the value of the r-count is more than the value of the *r*-table, the question item is considered valid. Conversely, if the value of the *r*-count is smaller than the *r*-table's, the question item is considered invalid. The number of *r*-tables in the validity test, with a significance level of 0.05 and a sample size 144, is 0.1625.

The table below displays the outcomes of the validity test conducted on the research instrument for the leadership style variable. Horton (2003) categorizes the discussion on management variables into three indicators: strategic leadership, program and process management, and networks and partnerships. Overall, the leaders of BPBDs in the selected regions in this study possess a comprehensive understanding of organizational management and enhancement, particularly in decision-making, where the top executive consistently includes employees. However, rapidly changing the leadership of offices within the province government and district/city administrations, including BPBD itself, will inevitably impact the agency's effectiveness. Furthermore, this issue is exacerbated by the leader's background, which does not align with the agency's mandate. The BPBD, responsible for managing disaster affairs, should be headed by an individual with a strong academic background and extensive disaster expertise.

4.4. The effect of leadership style and internal communication on employee performance

The **Table 9** displays the outcomes of the validity test conducted on the research instrument for the leadership style variable.

Table 9. Validity test of leadership style variables.

Question items	Corrected item-total corerelation	*R*-table value	Description
*X*1.1	0.434		Valid
*X*1.2	0.415		Valid
*X*1.3	0.545		Valid
*X*1.4	0.354		Valid
*X*1.5	0.453		Valid
*X*1.6	0.317		Valid
*X*1.7	0.295		Valid
*X*1.8	0.542	0.1625	Valid
*X*1.9	0.450		Valid
*X*1.10	0.514		Valid
*X*1.11	0.472		Valid
*X*1.12	0.541		Valid
*X*1.13	0.506		Valid
*X*1.14	0.422		Valid
*X*1.15	0.522		Valid

Source: Primary data processed, 2024.

Based on the validity test results for the leadership style variable, as shown in the table above, it can be concluded that all 15 question items used to measure the leadership style variable are valid. Therefore, it can be concluded that the question items used by researchers are valid for measuring leadership style in BPBD North Sumatra.

The validity test results for the instrument used to measure internal communication in BPBD North Sumatra, as presented in the following table, reflect a

comprehensive evaluation. This test, which assesses the accuracy and effectiveness of the measuring instrument, was conducted on the fourteen (14) question items meticulously selected by the researchers.

Based on the results of the internal communication variable instrument validity test **Table 10** above, the 14 question items used to measure as a measuring instrument used to measure internal communication variables are declared valid.

Table 10. Internal communication variable validity test table.

Question item	Corrected item-total corerelation	*R*-table value	Description
*X*2.1	0.714		Valid
*X*2.2	0.671		Valid
*X*2.3	0.622		Valid
*X*2.4	0.706		Valid
*X*2.5	0.466	0.1625	Valid
*X*2.6	0.552		Valid
*X*2.7	0.509		Valid
*X*2.8	0.516		Valid
*X*2.9	0.446		Valid
*X*2.10	0.507		Valid
*X*2.11	0.620		Valid
*X*2.12	0.530		Valid
*X*2.13	0.629		Valid
*X*2.14	0.712		Valid

Source: Primary data processed, 2024.

The validity test of the employee performance variable instrument was conducted to determine the measuring instrument used to assess employee performance at BPBD North Sumatra. The results are provided in **Table 10**. The validity test of the employee performance variable instrument, as shown in **Table 10**, confirms that the ten (10) question items used to measure employee performance are valid. This is supported by the Corrected item-total correlation values of these ten (10) questions items, which exceed the *r*-table value of 0.1625 at BPBD North Sumatra.

The validity test results of the employee performance variable instrument in **Table 11** indicate that the 10 question items used to measure employee performance are considered valid. This is because the Corrected item-total correlation value of these ten (10) questions items is higher than the *r*-table value of 0.1625.

Reliability refers to the degree to which measurement results stay consistent while assessing the same symptoms multiple times using the same measuring device (Siregar, 2013). The reliability test calculation technique employed in this study utilizes the Alpa Cronbach method, which is specifically designed to assess the reliability of tests that involve binary response options such as “true” or “false” or “yes” or “no.” However, it is also applicable for evaluating the reliability of tests that measure attitudes or behaviors. A test is considered reliable if the calculated reliability coefficient is greater than 0.6 and unreliable if the calculated reliability is less than 0.6.

Table 11. Results of the employee performance variable validity test.

Question item	Corrected item-total corerelation	*R*-table value	Description
Y.1	0.570	0.1625	Valid
Y.2	0.509		Valid
Y.3	0.545		Valid
Y.4	0.497		Valid
Y.5	0.441		Valid
Y.6	0.570		Valid
Y.7	0.587		Valid
Y.8	0.490		Valid
Y.9	0.572		Valid
Y.10	0.533		Valid

Source: Primary data processed, 2024.

The Cronbach Alpha (α) value of the three variables studied in **Table 12** is greater than 0.6, indicating that the Leadership style, internal communication, and employee performance questionnaires are reliable and suitable for use as a measuring tool in statistical analysis to address the research objectives.

Table 12. Reliability test results.

Variable	Total number of items	Cronbach's Alpha	Rate limitation	Description
Leadership style	15	0.718	0.6	Reliable
Internal communication	14	0.844	0.6	Reliable
Employee performance	10	0.716	0.6	Reliable

Source: Primary data processed, 2024.

4.5. The Effect of leadership style on employee performance BPBD North Sumatra Province

The multiple linear regression analysis yielded a *t*-count value of 2.890, greater than the *t*-table value of 1.655, indicating a significant relationship. The significance level of 0.04 is less than the conventional threshold of 0.05. Therefore, it is evident that the leadership style significantly contributes to the performance level of BPBD employees in North Sumatra Province. Additionally, the Coefficient of Determination calculation revealed that the leadership style accounts for 12.1% of the influence, while other variables account for 87.9%.

The research findings are consistent with those conducted by Suryanita (2018), which revealed a *t*-count value of 0.836 with a significance level of 0.406 > 0.05. This indicates that leadership style has a significant impact on employee performance. Similarly, Laksmiwati (2020) demonstrated that the calculation of leadership style resulted in a 49.7% effect on employee performance. Kritanto and Yonatha (2015) also found that the hypothesis testing yielded a *t*-count value of 0.913 > 0.05, indicating a positive influence of leadership style on employee performance. The preceding statement suggests that the leadership style aspect is crucial in enhancing staff performance in delivering services to the community. Hence, the leadership style plays a crucial role in public sector organizations' ability to attain optimal staff

performance. To enhance the robustness of this research, an initial survey was undertaken to investigate the leadership style within the BPBD of North Sumatra Province, as outlined in the subsequent **Tables 13**–**15**.

Table 13. Autocratic leadership style pre-survey results.

Statement	Amount	Yes	No
The leadership of BPBD North Sumatra Province exercises authority to ensure that all actions are directed towards achieving goals, and decisions are made based on the leadership of BPBD North Sumatra Province.	11	5	5
The leadership of BPBD North Sumatra Province expects employee compliance and loyalty.	11	11	0
Authority is centralized at the head of the BPBD of North Sumatra Province.	11	9	1
The leadership of BPBD North Sumatra Province does not develop subordinate initiatives.	11	0	11
The leadership of the BPBD of North Sumatra Province only demands the achievements and work of subordinates.	11	0	11

Source: BPBD Employee Survey North Sumatra Province, 2024.

Table 14. Pre-survey results of democratic leadership style.

Statement	Amount	Yes	no
The leadership of BPBD North Sumatra Province exercises authority to ensure that all actions are directed and determined towards achieving goals, relying on the leadership of BPBD North Sumatra Province.	11	5	5
The leadership of BPBD North Sumatra Province expects employee compliance and loyalty.	11	11	0
Authority is centralized at the head of the BPBD of North Sumatra Province.	11	9	1
The leadership of BPBD North Sumatra Province does not develop subordinate initiatives.	11	0	11
The leadership of the BPBD of North Sumatra Province only demands the achievements and work of subordinates.	11	0	11

Source: BPBD Employee Survey North Sumatra Province, 2024.

Table 15. Pre-survey results of laissez faire/free control leadership style.

Statement	Amount	Yes	No
The head of the BPBD of North Sumatra Province exercises limited power and instead grants subordinates complete autonomy in doing their duties.	11	2	8
The leadership of BPBD North Sumatra Province only participates in monitoring the performance of subordinates.	11	1	10
The leadership of the BPBD of North Sumatra Province just delegates tasks without offering guidance or instructions on the allocated activities.	11	0	11

Source: BPBD Employee Survey North Sumatra Province, 2024.

Nawawi (2003) defines leadership style as how a leader influences the thoughts, feelings, attitudes, and behavior of members or subordinates within an organization. The Head of BPBD North Sumatra Province demonstrated a leadership style that influenced his subordinates. Based on pre-research, it was found that the leadership style applied by the Head of BPBD North Sumatra Province is Democratic, according to Bill Woods' classification of leadership styles (Erlangga, 2018). This conclusion was drawn from a survey among eleven (11) employees. The Head of BPBD North Sumatra Province applies a democratic leadership style guided by the regulations outlined in the Governor Regulation (PERGUB) of North Sumatra Province Number 31 of 2019. This regulation addresses explicitly the duties, functions, job descriptions, and work procedures of the Regional Disaster Management Agency of North Sumatra Province.

The leadership style is a crucial determinant of a leader's ability to guide the organization toward achieving its objectives. Leaders must effectively guide, instruct, rally, and synchronize organizational activities. Laksmiwati (2020) asserts that a leader must possess administrative aptitude, encompassing the abilities to plan, organize, command, coordinate, and control. Every aspect of managerial competence is employed to achieve organizational objectives or aims. The leader's managerial skill refers to their capacity to effectively coordinate and direct the organization's people towards attaining goals, employing a leadership style that involves active management. The leader's adeptness in management and meticulous oversight enhances the caliber of work his employees perform. According to Handoko in Laksmiwati (2020), leaders are successful when they effectively motivate their subordinates to achieve high-quality and productive work, as evidenced by the outcomes.

The attainment of organizational targets is significantly impacted by the qualities and competencies of the leadership. The systematic execution of operations, beginning with planning and ending with control, will guide members of the organization towards a collaborative pattern that ultimately results in attaining objectives. A leader's capacity is characterized by their utilization of strategic planning, efficient organization, effective command, seamless coordination, and meticulous control within the most pragmatic framework to accomplish the organization's objectives.

Organizational performance is contingent upon the individual performance of each employee. Employee performance is determined by the quantity and quality of work accomplished by the employee within a specific time frame. Various factors influence employee performance levels, including motivation, discipline, environment, knowledge, and, notably, the leader. Each leader has a distinct style that defines their approach to leadership. This is because leaders are expected to possess the ability to effectively manage and supervise their subordinates in executing activities in alignment with established regulations. Furthermore, the leader must have the ability to exemplify desired behaviors through their daily actions. Adopting a congenial demeanor, delegating authority to subordinates, and ensuring the provision of enough resources and amenities can greatly enhance the performance of employees. The findings of this study demonstrate that the leadership style implemented by the Head of BPBD North Sumatra Province has a direct impact on employees' performance. The descriptive analysis test of respondents' answers reveals that 111 individuals (77.1% of respondents) rated the leadership style of the Head of BPBD North Sumatra Province as good. Additionally, 21 respondents (14.6%) rated the leadership style as very good in terms of influencing subordinates, while 12 respondents (8.3%) considered it sufficient.

According to the findings of the conducted research, it can be inferred that the leadership style currently employed by the Head of BPBD North Sumatra Province has a positive impact on influencing his subordinates, leading to improved employee performance. According to Gooty, Janaki, et.al. (2010), leadership style refers to the way a leader behaves or the strategy they use to affect the emotions, attitudes, and actions of members or subordinates in an organization. The goal is to influence or enhance the performance of the subordinates. The research conducted at the BPBD of North Sumatra Province indicates that leadership style is a significant factor influencing employee performance. Effective leadership that positively influences

subordinates can enhance employee performance. Conversely, poor leadership style within the BPBD of North Sumatra Province can negatively impact the performance of its employees.

4.6. The impact of internal communication on employee performance at BPBD North Sumatra Province

The multiple linear regression analysis results indicate that the *t*-count value is 1.174, less than the *t*-table value 1.665. Therefore, internal communication has a partial but insignificant effect on employee performance. This conclusion is supported by the significance value of 0.89, which is greater than the threshold of 0.05. In summary, the variable of internal communication positively affects the performance of BPBD employees in North Sumatra Province, but the effect is not statistically significant. The research findings align with the study by Reny (2019), demonstrating a path coefficient value of 0.349 and a *t*-value of 3.025. This indicates that the value exceeds the critical *t*-value of 1.96, suggesting that internal communication significantly and positively impacts employee performance. In her study, Laksmiwati (2020) demonstrates that communication significantly impacts employee performance, accounting for 53.5% of the variance. The remaining 46.5% is attributed to other variables. Additionally, Laksmiwati highlights the role of internal communication on employee performance. The explanation above demonstrates that fostering more favorable internal communication between supervisors and subordinates and among employees can enhance the employees' performance.

Internal communication in an organization can indirectly impact an individual's lifestyle, just like how an individual expresses their opinions and emotions towards coworkers who hold the same position or towards the leadership. According to Lawrence D Brennan's thesis (Reny, 2019), internal communication refers to the transmission of messages within the confines of an organization. Internal communication encompasses several forms, such as policy announcements, meeting minutes, procedural modifications, and directives from superiors. Internal communication in organizations can be categorized into upstream, downward, and horizontal communication.

In this study, individuals inside the organization are identified as critical characters responsible for upholding the stability of internal communication. Effective communication between leaders and subordinates and among employees is a crucial catalyst for ensuring seamless internal communication. Efficiently managing internal communication has a significant impact on the employees' performance. This is evidenced by a survey by researchers on a sample of eleven (11) employees, which indicate that the internal communication within the BPBD of North Sumatra Province is in a favorable state, characterized by effective internal communication. Effective communication occurs in both directions between leaders and subordinates, as well as between subordinates and superiors. Additionally, employees maintain positive connections with one another, which contributes to completing their jobs. In addition, researchers conducted a study by distributing questionnaires to 144 employees of the BPBD in North Sumatra Province. The study aimed to assess the state of internal communication within the organization. The descriptive test results revealed that 20

respondents (13.89%) believed the internal communication at the BPBD in North Sumatra Province was in excellent condition. Furthermore, 120 respondents (82.3%) stated that the internal communication was good. Four (4) respondents (2.8%) reported that the current communication fell under the adequate category. The descriptive tests conducted on respondents regarding internal communication in the BPBD of North Sumatra Province revealed that communication between superiors and subordinates, subordinates and superiors, and employees and fellow employees was rated as good.

The findings of the presentation above indicate that internal communication significantly impacts employees' performance at BPBD North Sumatra Province. This demonstrates that when the relationship between leaders and subordinates is effective in carrying out duties and responsibilities, providing input in conflict resolution, and fostering internal communication among employees at BPBD North Sumatra Province, performance will be enhanced. The workforce at the North Sumatra Province BPBD will expand. However, the internal communication between superiors and subordinates, as well as among employees, is. In that case, it will positively impact the performance of the employees at the North Sumatra Province BPBD.

4.7. The impact of leadership style and internal communication on employee performance

According to the results of hypothesis testing and data processing, it can be concluded that both leadership style and internal communication significantly impact the performance of BPBD personnel in North Sumatra Province. This conclusion is supported by rejecting the null hypothesis (H0). This empirical research demonstrates that both leadership style and internal communication significantly and simultaneously impact the performance of BPBD personnel in the North Sumatra Province. The joint test results yielded an *F*-calculated value of 10.868, which exceeded the *F*-table value of 3.06. This indicates that, with a significance level of 95%, the leadership style and internal communication significantly impact the performance of BPBD personnel in the North Sumatra Province.

Based on the partial test, it is evident that the coefficient for leadership style is positive. This indicates a favorable correlation between leadership style and employee performance. The performance of BPBD North Sumatra Province personnel is significantly influenced by their leadership style, with a level of significance of 0.04, which is lower than the threshold of 0.05. Each increment in leadership style by one (1) unit will result in a performance gain of 0.177 for the North Sumatra Province BPBD. According to theoretical foundations, leadership style refers to the specific behavior or approach employed by a leader to effectively influence their subordinates' ideas, emotions, attitudes, and actions to accomplish the organization's goals.

Leadership is interacting with subordinate personnel to manage the organization and achieve its goals effectively. The leadership style in this study aligns with Sheldrake's theory (Lakmiwati, 2020), which posits that leadership style encompasses various indicators such as Planning, Organising, Commanding, Coordination, and Control. These indicators are employed to facilitate the organization's management process and achieve its goals. Employee performance is a crucial factor in attaining organizational objectives. An organization can be deemed successful if it can attain or

surpass the predetermined targets for employee performance. Suppose the leadership style effectively influences or directs subordinates, enabling them to collaborate and motivate them towards a specific goal. In that case, the performance of North Sumatra Province BPBD employees will improve. However, this positive outcome may not be achieved if the leadership style fails to influence subordinates properly. The performance of staff at the North Sumatra Province BPBD will be impacted.

Internal communication is another influential component in employee success in this research. Based on the regression test, it is evident that there is a positive coefficient between internal communication and the performance of BPBD personnel in North Sumatra Province. The *t*-test analysis reveals that communication significantly impacts the performance of employees in the North Sumatra Province BPBD, as evidenced by a *t*-value of 1.174, which is lower than the critical *t*-value of 1.655. The findings of the multiple linear regression equation demonstrate that a 1 unit increase in internal communication leads to a 0.106-unit improvement in employee performance.

Effective communication is crucial for the smooth functioning of an organization. This pertains to the communication-based relationships among individuals inside an organization. Efficient communication within an organization ensures the seamless transmission of all transmitted information. Internal communication in an organization is the transmission of communications inside specific boundaries based on the theoretical foundation of communication. Effective internal communication inside an organization, encompassing both top-down, bottom-up, and lateral communication, fosters efficient work delegation, clear delineation of duties, collaborative efforts, and effective dispute resolution.

The internal communication within this study project involves both vertical and horizontal communication. Effective communication between leaders and subordinates, including conflict resolution, opinion sharing, adequate supervision, and good communication among employees, both in information sharing and conflict resolution, will enhance employee performance. If there is a lack of effective communication within BPBD North Sumatra Province, particularly between leaders and subordinates and among employees, it will have a negative impact on the employees' performance. The determination test yielded an adjusted *R* square value of 0.121. This study demonstrates that 12.1% of the performance of BPBD North Sumatra personnel may be attributed to the two variables of leadership style and internal communication. The remaining 87.9% of the performance is impacted by other factors not examined in this research.

4.8. An assessment of the disaster management in North Sumatra, focusing on the execution of intergovernmental networks and the capacity of the regional government

4.8.1. Controlling and evaluation

The evaluation of the disaster management plan must comply with the regulations outlined in Law Number 25 of 2004, which pertains to the National Development Planning System (SPPN), as well as Government Regulation Number 39 of 2006, which outlines the procedures for controlling and evaluating the implementation of

development plans. The regulations above are further elaborated in the Regulation of the Minister of National Development Planning/Head of the National Development Planning Agency Number 1 of 2017, which provides detailed guidelines for evaluating national development. The outcomes of this assessment are anticipated to furnish data that will serve as a foundation for formulating policies concerning current circumstances, such as policy creation or policy discontinuation, as well as input for planning and allocating funds for the upcoming time. The **Table 16** serves as a framework for overseeing and assessing the execution of disaster management plans.

Table 16. Disaster management control and evaluation framework.

Time	Materials/evaluation monitoring	Monitoring/evaluation criteria/indicators	Implementing monitoring/evaluation
Semester	Output achievement	Percentage of achievement	Cross-sector forums and disaster management planning forums
Year	Guidance of the parties Other planning guides Review disaster management plans	-	Cross-sector forums and disaster management planning forums
Middle period	Disaster Management Review	Factors causing failure to achieve plans and actions	Cross-sector forum
	Target achievement	Follow up plan	
End of period	Target achievement	Factors causing failure to achieve plans and actions	Cross-sector forum
	Achievement of goals	Follow up plan	
		Learning	

Source: FGD and Data Analysis, 2024.

4.8.2. Control and monitoring

Each semester's program and performance indicators are specific goals and targets that regional governments want to achieve within the next five years. They clearly measure the regional governments' performance and demonstrate their commitment to supporting the attainment of critical goals and targets at the regency/city, provincial, and national levels. A monitoring and evaluation plan identification matrix was developed for the disaster management plan document to streamline the monitoring and evaluation process. This matrix is based on the timing of monitoring activities. The purpose of controlling the implementation of disaster management planning is to ensure the successful accomplishment of the goals and targets outlined in the plan through the oversight and supervision of operations. Government Regulation Number 86 of 2017 conducts the control and evaluation procedures, which outlines the specific steps for monitoring and assessing the implementation of development plans. Monitoring is conducted to assess the progress of activity output indicators and identify challenges encountered in the implementation of disaster management by the regional administration.

Key elements in the implementation of monitoring include the duration of monitoring, the specific aspects being monitored, the criteria used to assess progress, the sources of evidence, and the methods employed to determine the effectiveness of disaster management activities. These methods may include coordination meetings,

mandatory reports from those responsible for implementation, and field visits. Furthermore, it involves overseeing implementers' actions and observing others' performance.

The control components encompass integrating parties, integrating programs and activities with other plans, identifying issues hindering plan and action implementation, and formulating follow-up plans. Control activities are conducted during the semester to assess progress in achieving output indicators. **Table 17** displays the control framework per semester.

Table 17. Monitoring framework table per semester for the implementation of disaster management actions.

Monitoring time	Things to monitor	Monitoring criteria	Sources of evidence	Technical/method	Implementer
Semester 1 year 1 and per semester (coordination)	• Preparation of baselines • Legislation • Integration into Regional Apparatus Organizations (OPD) • Realization of Activities	• Availability of baseline data • Convenience, acceleration, support and goal achievement • Activity indicators and activity input	Documentation and/or reports Legislation	FGD	Technical team for preparing Disaster Management Plans
Per year (monitoring and evaluation)	• Realization of programs/activities for the current year • Regional regulations/policies/guide lines required to implement the action plan	• Program/activity indicators • Relevance of regulations/policies/guide lines to support program/target achievement	• Monitoring report • Documentation and/or reports • Relevant regional regulatory/guideline /policy documents	• FGD • Literature review	• Technical team for preparing Disaster Management Plans • BPBD • Bappeda
Semester ke 1 tahun ke 3 (peninjauan kembali Rencana Penanggulangan Bencana (RBP)	Review RBP documents	• There is/isn't there disaster event big - necessary done adjustment • There is/isn't there system change local government (necessary solution)	RBP Review Report	• FGD • Literature review	• RBP preparation technical team • Disaster Risk Reduction Forum • Cross-Sector Forum • BPBD
2nd semester 5th year (evaluation)	• Drafting endline data • Integration to other OPDs • Integration to other plans • Realization target/goal to solving strategic issues • Learning	• Availability endline data • Relevance strategy/direction policies and program • Synergy programs/activities spatial affairs/sectors, KLHS, etc. • Effectiveness, efficiency, and action plan	Documentation and/or reports evaluation	• FGD • Literature review	• BPBD • Bappeda

Source: FGD and Data Analysis, 2024.

4.8.3. Program evaluation

Program assessment is a set of managerial tasks that involve assessing the effectiveness or measuring the attainment of a goal using predetermined criteria backed by accurate, relevant, and sensitive data and information (Vedung, 2017). The research focuses on evaluating the effectiveness of disaster management by examining and assessing the outcomes and goals of its implementation using specified indicators. It also aims to identify lessons learned and evaluate procedures for disaster management. The implementation and evaluation of disaster management can be accomplished by self-assessment, analysis of reporting papers, and evaluation of field implementation.

4.9. Joint committee standard indicators

4.9.1. Evaluation utility standards

In the program evaluation's Utility Standards section, the researcher selected U2, which pertains to the evaluator's credibility. The results acquired from the interviews conducted at BPBD, which were dispersed according to the research sample, are as follows (**Table 18**):

Table 18. Credibility of evaluators (U2).

Evaluation activities	Meet the standards	
	Yes	No
The control and assessment conducted by both government and non-government institutions executing activities and actions in the RPB is commendable.	√	
The process or outcomes of written oversight and assessment of diverse papers generated by the parties involved in executing activities and measures outlined in the disaster management plan.	√	
Control and evaluation are conducted to verify the implementation of different activities and actions in the RPB at various sites.	√	
Examine the disparity between the outcomes of the program and the anticipated and accomplished objectives of the disaster management strategy.	√	
Analysis of the contribution of activity output achievements to target and program indicators.	√	
Lessons learned from the RPB implementation process are explained the process of achieving success and failure.	√	
A Regional Joint Secretariat Team is established by the Regional Government. The secretariat has the option to utilize the Regional Disaster Management Forum or other pre-existing structures within the region.	√	
Respond appropriately to criticism and suggestions from stakeholders Interest.		√
Keep abreast of developments in political and social forces.		√
Inform interested parties about the progress of the evaluation process.	√	
Quantity Yes	**8**	

According to the table, we can infer that the program's utility standard for the evaluator credibility variable is excellent. This is because the program employs evaluators who are competent and credible. Assessments of disaster management have been conducted, including semester evaluations, annual evaluations, mid-term evaluations, and end-of-period reviews. The semester assessment is conducted concurrently with the monitoring process, specifically emphasizing quantifying and evaluating the attainment of activity outcomes (output). According to interviews conducted at BPBD North Sumatra, the evaluation was performed by experienced and competent individuals. The evaluation provides an understanding of the challenges faced in measuring and assessing party integration and integrating the RPB with other planning efforts and achieving program performance outcomes. This demonstrates that program evaluation in disaster management aligns with established protocols.

4.9.2. Evaluation feasibility standards

In evaluating disaster management plans, the researcher selected F2, namely Political Feasibility, as the criterion in the feasibility standard section. The outcomes derived from the interviews were as follows (**Table 19**).

Table 19. Political feasibility (F2).

Evaluation activities	Meet the standards	
	Yes	No
Political support	√	
Consistency with national policy	√	
Regional regulations, norms, policies, and regional apparatus. Organizations mandated to execute the action plan	√	
Stakeholder engagement	√	
Consistency of political agenda with integration of affairs programs/activities	√	
Availability of baseline data	√	
The significance of regional regulations, standards, policies, and the Regional Apparatus. Organizations that aid in the accomplishment of program and target objectives	√	
Resilience to political change		√
Effectiveness, efficiency and disaster management action plans	√	
Capacity and resources	√	
Quantity Yes	**9**	

According to the chart, it can be inferred that the program feasibility requirements for the Political Feasibility Procedure variable are excellent, as they align with the current methods. During interviews with the Dairi Regency and Karo Regency BPBD agencies, we received feedback that considering Political Viability in program evaluation can enhance the program's longevity and effectiveness, even in changing political circumstances.

4.9.3. Evaluation propriety standards

Researchers selected P5, a comprehensive and unbiased evaluation, as the primary benchmark for assessing disaster management strategies. The outcomes derived from conducting interviews were as follows (**Table 20**).

Table 20. Complete and fair assessment (P5).

Evaluation activities	Meet the standards	
	Yes	No
Identify program objectives, design appropriate performance indicators, collect necessary data	√	
Considering the diverse perspectives and interests related to the program, and remaining unaffected by extraneous variables	√	
Conduct a thorough analysis of the data and present the findings in a comprehensive manner	√	
Responding to criticism of the draft report		√
Prudent assessment preparation, consistent data gathering, comprehensive examination, and concise communication	√	
The evaluation information, which includes objectives, methods, findings, and suggestions, should be easily accessible and comprehensible to all those who are interested	√	
Evaluation receives and responds to feedback from stakeholders regarding the quality and usefulness of evaluation results	√	
The evaluation effectively identifies the program's strengths and problems, and offers specific recommendations for improvement	√	
Assessments are conducted using a methodical and planned approach, which involves meticulous planning, rigorous data gathering, and comprehensive analysis	√	
Evaluation provides balanced information about program successes and failures, and is not influenced by bias or particular interests	√	
Quantity Yes	**9**	

According to this table, assessments that consider the P5 principles can yield more precise, pertinent, and valuable outcomes for decision-making and program

enhancement. The evaluation process can comprehensively assess the program's performance by conducting interviews and focus group discussions (FGDs). This can be achieved by ensuring that the evaluation encompasses all relevant program areas, engages many stakeholders and employs a suitable methodology. Consequently, a more comprehensive understanding of the program's performance can be obtained.

Furthermore, by guaranteeing that evaluations are conducted with fairness, transparency, and objectivity, they can be relied upon by all stakeholders and serve as a solid foundation for enhancing and creating superior programs in the future. Using the P5 principles, program assessment can serve as a potent instrument for improving program efficiency and delivering enhanced advantages to society and other stakeholders.

4.9.4. Evaluation accuracy standards

In evaluating disaster management programs, the researcher specifically selected A1, which refers to program documentation, as the criterion for assessing accuracy standards. The outcomes derived from conducting interviews were as follows (**Table 21**).

Table 21. Program documentation (A1).

Evaluation activities	**Meet the standards**	
	Yes	**No**
Program documentation is continuously updated and amended to align with program advancements and changes		√
The evaluation assesses the degree to which program materials were consulted with stakeholders, in order to ensure that the information presented in the documents encompasses diverse perspectives	√	
The program documents are stored in a secure and organized manner to ensure easy future access, if needed	√	
Involving independent observers to describe how the program actually operates		√
Assess the document's pertinence to the evaluation's objectives and requirements, enabling the document's information to be utilized for informing the evaluation	√	
Examine the degree to which program documents may be obtained by individuals who are interested, in order to ensure that the information inside the documents can be utilized efficiently	√	
Verify the coherence between program papers and information obtained during the review process, in order to guarantee that they accurately represent the actual state of the program	√	
Verifying the availability of program papers promptly, in order to comprehend program advancements and outcomes in real-time	√	
Evaluation assesses the extent to which program records, such as program plans, activity reports, and participation data, are consistently and timely accessible	√	
Evaluation determines if program documents comprehensively address all pertinent components of the program and accurately reflect the implemented actions	√	
Quantity Yes	**8**	

From this table, it can be inferred that evaluators can determine the degree to which program documentation fulfills the necessary criteria for supporting thorough and precise program evaluation. Based on the acquired interview data, it is evident that having comprehensive, accurate, and current program documentation is crucial for facilitating successful program evaluation. Comprehensive program papers enable more rigorous and precise assessment, leading to a deeper comprehension of program effectiveness and impact.

Storing program papers properly and securely guarantees that the information may be easily retrieved in the future if necessary. Furthermore, engaging with critical parties and consistently revising program materials guarantees that program documentation is current and facilitates ongoing program enhancement. By focusing on indicator A1, program evaluation can be conducted with increased efficacy, resulting in enhanced decision-making and program enhancement opportunities in the future. According to the researchers' meta-assessment, the evaluation standards can be classified as very high/very good, with a score of 85. These standards consist of four categories: utility standards, feasibility, propriety, and correctness.

Following the assessment above, this study will examine the cooperation among stakeholders in disaster management in North Sumatra.

4.10. Stakeholder collaboration in disaster management in North Sumatra Province

4.10.1. Role of stakeholders

Figure 3 shows the conceptual model of the relationship between independent variables, namely Leadership with the symbol X1 and Communication with the symbol X2, on the dependent variable BPBD Employee Performance According to Regional Samples with the symbol Y. This model describes three hypotheses (H1, H2, H3), to evaluate how much influence leadership and communication have on employee performance in the BPBD (Regional Disaster Management Agency) environment in a regional context.

The study results illustrate that the stakeholders in the disaster management process in North Sumatra Province consist of 5 (five) groups, namely the Government, the Community, NGOs, the private sector, and universities. Senge (1996) stated that each group has different interests, so it is necessary to define common goals to establish a collaborative process. **Figure 4** below shows the five stakeholder groups involved in disaster management in North Sumatra Province. **Figure 4** was adopted and processed by researchers from Freeman et al. (2010), Grimble (1998), and Primary Data Sources.

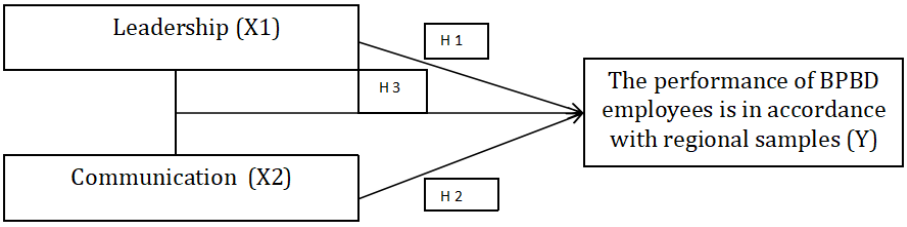

Figure 3. Framework.

Source: Researcher Development Framework, 2024.

Figure 4 shows five stakeholder groups with parts of each. Central governments include the National Disaster Management Agency (BNPB), while local governments include the Regional Disaster Management Agency. WALHI, FPRB, and Muhammadiyah Management Center are non-governmental organizations. Private sector players include PT. PLN, Bank Sumut, and Bank Mandiri. USU, UISU,

POLMED, and UNIMED represent higher education, as do the people in 25 districts and eight cities affected by the disaster in North Sumatra.

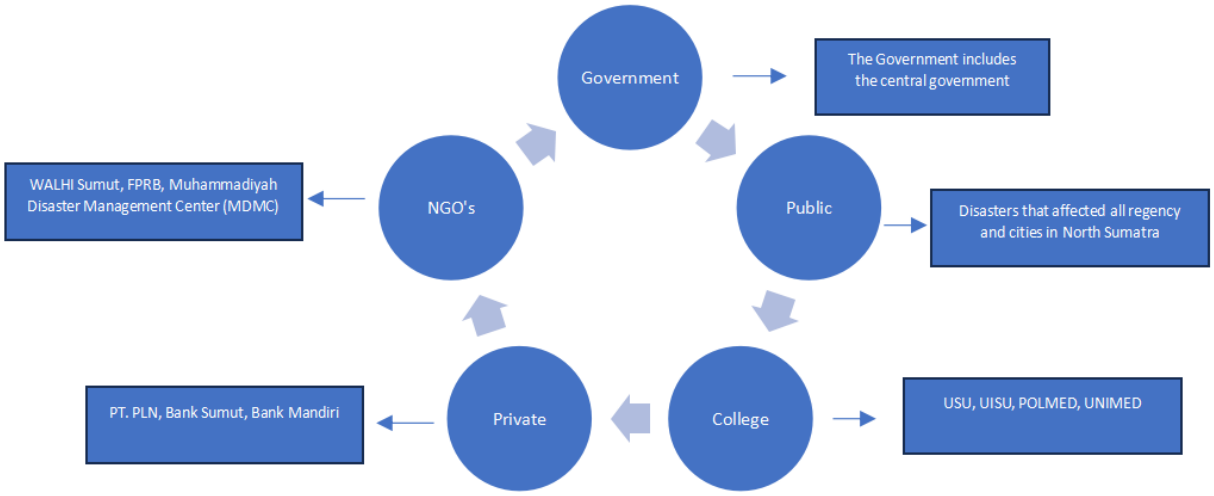

Figure 4. Stakeholders in disaster management in North Sumatra Province.

North Sumatra Province Regional Regulation Number 08 of 2013 supports natural catastrophe management. It was then approved by the Decree of the Governor of North Sumatra, Number 188.44/322/KPTS/2022, which established disaster emergency management regions in the province on 11 May 2022. The goal is to speed up the North Sumatra Province BPBD team's arrival at the catastrophe site, especially during the "Golden Time" of emergency disaster rescue. Disaster management stakeholders participate in policymaking. The successful disaster management approach in North Sumatra Province was mapped out using a systematic and rigorous process, including a Focus Group Discussion (FGD). Has several parts, as shown in **Figure 4**.

Describing the role of each stakeholder is not easy, as it means to analyze what each stakeholder has done and their goals. These objectives must be used as a starting point for formulating common goals so that a so- called multi-stakeholder partnership is created, where all stakeholders must accept this (Nonet et al., 2022). **Figure 5** below maps the roles of each stakeholder in disaster management in North Sumatra Province.

Figure 5 shows that each stakeholder's role is the first step in defining a shared vision for disaster management collaboration as a partnership, as stated by Arnstein (1969). Disaster management policies are provided by the government. The government must also report local calamities. This informs regional disaster policies. Disaster budgets include mapping data and information that affects policy. Disaster management in North Sumatra Province requires help from the government budget. Bureaucratic attitudes affect disaster management funding, which can help or hinder policy implementation (Sylves, 2019). Disaster mitigation, response, and recovery are funded by the government. Government catastrophe mitigation includes structural and non-structural solutions. Structure-supported. Technical solutions include building solid buildings, moving to safer regions, updating infrastructure, erecting shelters, and deploying early warning systems, transforming the physical environment to achieve this. Structural mitigation emphasizes disaster-resistant building construction.

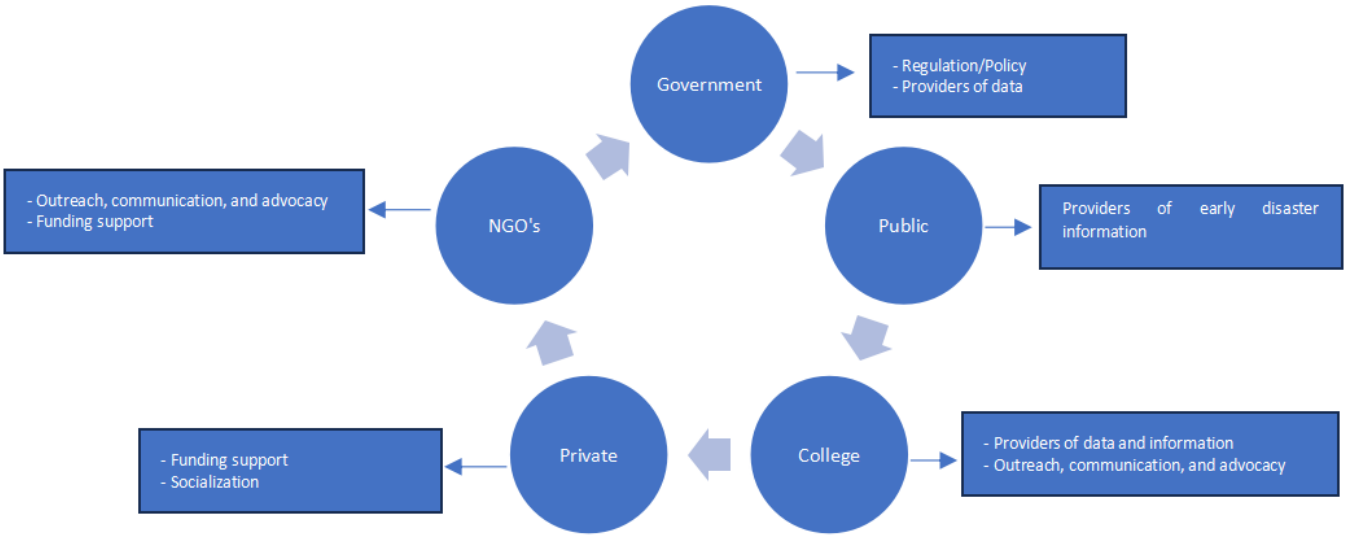

Figure 5. The Role of Stakeholders in disaster management in North Sumatra Province.

Through outreach and advocacy to communities and district/city administrations, notably in North Sumatra, the government mitigates non-structural damage. The disaster resilient village (Destana) promotes social contact and public awareness. NGO stakeholders include WALHI, FPRB, and MDMC. These organizations prioritize disaster management in North Sumatra. The NGO is involved in policymaking and execution. He aggressively socializes, communicates, and advocates during pre-disaster/mitigation, emergency response, and recovery. NGOs train each sub-district branch coordinator to speak about disaster mitigation. Those who receive this training will adjust to their company environment. The public was then introduced to it. NGOs use communication patterns that need to be staged for socialization and communication. Communication and socialization help communities prepare for disasters and recover. These goals are crucial to disaster management.

All interested individuals and communities can attend NGO coin-throwing events. Proceeds will fund mitigation and catastrophe response operations. NGOs provide financial support in this situation. The government has legislation in the disaster management budget, but international NGOs and community benefactors fund it. NGO intermediaries distribute disaster-management funds. NGO funding provides money and infrastructure for disaster response initiatives. Next are private sector stakeholders PT. PLN, Bank Sumut, and Bank Mandiri. Due to the growing issue in North Sumatra, outreach has also been involved as an emergency response funder. The private sector's main function is emergency response, which boosts their social responsibility and reputation. Emergency response universities include USU, UISU, POLMED, and UNIMED. After a disaster, emergency response is swift. Through rigorous scientific research, colleges also spread disaster-related data and information.

The final category encompasses the community, particularly individuals who are impacted and vulnerable, and more broadly, it includes the entire population of North Sumatra. Communities serve as sources of primary knowledge about disasters, enabling other stakeholders to initiate actions in disaster management. In addition to that, emergency response is a crucial aspect of societal responsibility. This is because considering society as an object and subject is an inherent aspect of catastrophe

management efforts. The community is becoming cognizant of the need to be prepared for disasters to mitigate risks in the event of a disaster. Other stakeholders are responsible for acquiring knowledge about community preparedness. Hence, a prompt reaction role is necessary when disasters can have a greater impact.

4.10.2. Multi-stakeholder partnership

Stakeholders are individuals or groups with a vested interest in actively participating in resolving current issues. The collaborative approach is structured into stages to ensure the involvement of multiple stakeholders. The five parties involved in disaster management in North Sumatra Province under the Disaster Risk Reduction Forum conducted the process of establishing shared objectives. Although the forum does not consist solely of five stakeholder sections, the researchers have identified these five stakeholders with many roles. The function of the Multi-Stakeholder Partnership in disaster management in North Sumatra Province is illustrated in **Figure 6**.

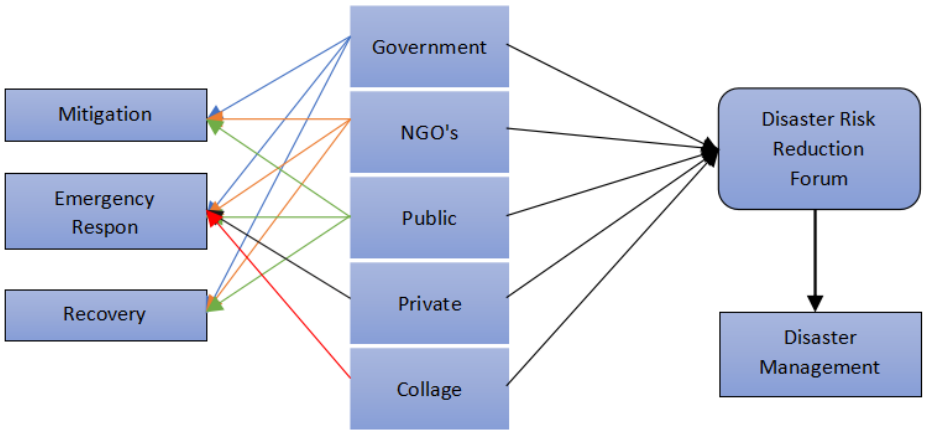

Figure 6. The role of multi-stakeholder partnership in disaster management in North Sumatra Province.

Figure 6 provides an account of the collaboration in disaster management in North Sumatra Province. The North Sumatra Province Disaster Risk Reduction Forum facilitated the collaboration of five stakeholders, each assigned specific duties in the disaster management process. Hemmati (2012) and Simpungwe (2006) argue that a multi-stakeholder partnership involves different sectors of stakeholders coming together to collaborate and achieve collective solutions. This statement is further supported by Hailu and Tolossa (2020) and Sartas et al. (2018). **Figure 6** illustrates the involvement of the government, NGOs, and communities in the mitigation, disaster response, and recovery stages. The corporate sector and universities play various roles in emergency response.

Capacity building, continual innovation, and more effective decision-making can increase stakeholder participation in Multi-Stakeholder Participation, according to Achyar et al. (2015) and Goldammer (2007). Warner (2005) supports this. This addresses environmental changes that require rapid adaptability to solve challenges. In North Sumatra Province, private sector and university involvement in disaster management must be maximized at all phases. Meanwhile, private sector participation

This sector appears to be dominant only during emergency response, although its usefulness before and after disasters is unclear. The disaster management method is not just a temporary solution but also promotes discipline and self-discipline to face disaster issues. North Sumatra is disaster-prone and vulnerable to natural calamities. To raise disaster awareness, you need knowledge and social responsibility.

Higher education institutions are also responsible for fostering catastrophe awareness and must actively engage in the entire disaster management process, from mitigation to recovery, to raise public consciousness. This position plays a crucial role in addressing the issues associated with disaster management in the province of North Sumatra. Naturally, it is tailored to align with the specific objectives of both private enterprises and colleges. Given the area's susceptibility to disasters, disaster management must be included as a fundamental component of the strategy or program on an annual basis.

5. Conclusion

Intergovernmental Networks are a concept that aims to maximize each region's potential by leveraging regional governments' expertise and resources. This approach promotes efficiency, effectiveness, synergy, and collaborative problem-solving, particularly in areas that involve shared interests across different regions. The findings of the discussion on inter-regional collaboration in disaster management offer diverse and significant insights for devising different strategies and solutions for disaster management in the areas, as implemented by the regional governments examined in this study. Several crucial points can be communicated: 1) Intergovernmental Networks are established between regions due to the recognition among regional governments of the need to exchange experiences and share responsibilities in disaster management. 2) Intergovernmental networks in disaster management have the potential to address the lack of technical regulations and the allocation of tasks among government levels, such as disaster logistics, based on research findings, as well as the distribution of disaster logistics during emergency response.

The regional government's capacity in disaster management has been suboptimal due to resource capacity and training deficiencies. Regarding infrastructure, the utilization of technology is commendable, and the financial resources are adequate for implementing disaster management, except unforeseeable situations. Regarding relationships and networks, researchers evaluate that the regional government is proficient in sustaining organizational interactions with other entities.

The research findings indicate that the combined influence of leadership and communication has a favorable and substantial impact on the performance of BPBD workers. The *F* test yielded a significance value of 0.000, which is less than the threshold of 0.05. The estimated *F* value of 10.868 is above the critical *F* value of 3.06. The positive impact demonstrates that effective leadership and communication will enhance the performance of BPBD personnel in North Sumatra.

The meta evaluation classifies it as "very high/very good," with a score of 85. This indicates that a thorough evaluation has been conducted to examine and evaluate the attainment of outcomes and goals in implementing disaster management in North

Sumatra. The evaluation focuses on the designated indicators, identifying valuable insights, and establishing mechanisms for reviewing disaster management plans.

Stakeholders in disaster management in North Sumatra are parties interested in disaster management. The results of this study can illustrate the role of multi-stakeholder disaster management and multi-stakeholder challenges in disaster management in North Sumatra Province. Disaster management involves five key stakeholder groups: the government, the commercial sector, non-government organizations (NGOs), universities, and the community. Each group has a distinct function in the disaster management, ranging from supplying data and information and offering financial help to engaging in advocacy and communication. Multi-stakeholder partnerships, like the Disaster Risk Reduction Forum in North Sumatra Province, are crucial for coordinating efforts in the disaster management process.

The primary objective is to optimize the corporate sectors and universities' involvement to enhance their contribution to the overall disaster management process, particularly in mitigation and recovery. This research has revealed the optimal collaboration methods for disaster management in North Sumatra. These methods can be implemented before, during, and after a flood. This research also highlights the individuals who can and cannot contribute to implementing collaborative governance. Collaboration among stakeholders is crucial in the management of disasters in North Sumatra. The government, commercial sector, NGOs, universities, and communities each have distinct roles. The government can promote private sector involvement to enhance efficacy, while institutions can augment their contribution to research. Community training and the utilization of disaster technology are equally significant. These efforts aim to enhance disaster management in North Sumatra, mitigating the effects of disasters and bolstering community resilience.

6. Recommendation

Some recommended contributions regarding the significance of this research include the need to support disaster management institutions in the regions by fostering commitment and agreement between governments. This can be achieved through a proportional inter-regional cooperation format, which ensures shared responsibility for disaster management. Regional governments must also recognize the importance of communication and collaboration across different levels of government in disaster management. It is crucial to understand that disaster management is not solely the duty of the affected area but rather a collective obligation. Regional governments in disaster management should develop plans to enhance their capacity to address vulnerabilities, particularly in terms of manpower and financial resources. Consequently, it is necessary to allocate funds to manage unforeseen calamities encountered by the Regional Government and devise ways to effectively address these obstacles. Regional governments must also find technologies that may be enhanced to enhance the efficiency of disaster management, as the challenges in assessing disasters vary throughout the regions under their jurisdiction.

When conducting research, it is crucial for local governments to give priority to the essential aspects of leadership and communication to enhance the performance of BPBD staff. BPBD executives should prioritize monitoring staff performance and

fostering positive connections to promote the generation of innovative ideas in executing tasks connected to disaster management.

It should be utilized as a benchmark or foundation for developing future disaster management strategies to ensure the continuity and enhancement of disaster management evaluation.

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