

Implementation of Standard Operational Procedures (SOP) Information Dissemination of BMKG Tsunami Early Warning at the Geophysical Station of Ternate

Abdulhalil Hi. Ibrahim¹

Lecture Universitas Muhammadiyah Maluku Utara, Indonesia
Email: chalilibrahim101@gmail.com

Thamrin Husen²

Lecture Universitas Muhammadiyah Maluku Utara, Indonesia
Email: thamrin892@gmail.com

Kustoro Hariyatmoko³

Lecture Universitas Muhammadiyah Maluku Utara, Indonesia
Email: kustorohariyatmoko@gmail.com

Raoda M. Djae⁴

Lecture Universitas Muhammadiyah Maluku Utara, Indonesia
Email: RaodamdjaeO@gmail.com

Marno Wance⁵

Lecture Universitas Pattimura, Indonesia
Email: marno.wance@fisip.unpatti.ac.id

Abstract

This study aims to determine the implementation of the Standard Operating Procedure (SOP) policy for the dissemination of tsunami early warning information by the BMKG at the Ternate Geophysical Station. The research method used is a qualitative descriptive survey method. The data collection techniques used were observation, documentation, and interviews. The data analysis in this thesis is after the implementation of the policy so that research is carried out by collecting data, reducing data, presenting data, and drawing conclusions. The informants in this study consisted of several staff of the Ternate Geophysical Station by conducting more in-depth interviews with the Operations staff. Then take information from officials of the North Maluku Provincial BPBD and Ternate City BPBD, BPBD Pusdalops staff, the Chairperson of the Ternate City PRB Forum, the Chairperson of the DPD PPDI North Maluku Province, and the community. The results showed that the implementation of the Standard Operational Procedure (SOP) policy for the dissemination of BMKG tsunami early warning information at the Ternate Geophysics Station had gone according to the mechanism. This study focuses on four aspects that affect the performance of the Ternate Geophysics Station related to the implementation of standard operating procedures for tsunami early warning information dissemination, namely aspects of communication, aspects of resources, aspects of disposition, and aspects of the bureaucratic structure by analyzing how they are implemented by looking at the performance of the operational officers of the Ternate Geophysics Station, response BPBD Pusdalops officers, community response to earthquake information and BMKG tsunami early warnings as well as

community actions in carrying out evacuations. Looking at the objective conditions of the research results, the recommendations that need to be implemented are for the government to increase public awareness of the risks and dangers of the earthquake and tsunami by building communication through coordination and socialization and training between institutions, building facilities, and infrastructure in their regions, establishing regulations as a form of delegation of authority, as well as adjusting conditions to aspects of the bureaucratic structure.

Keywords: Tsunami, Earthquake, BMKG, BPBD

Introduction

The North Maluku region is one of the regions with the highest number of earthquakes every year. Tectonically, North Maluku is an area that has a fairly high and complex level of seismicity, this is influenced by three large plates, namely the Eurasian plate, the Pacific Plate, and the Indo-Australian plate meeting in the Halmahera region (Ballantyne, 1991). The meeting of several of these plates causes the pushing of each other to make the North Maluku region has a fairly active potential for seismicity (Condie, 2016; Lourenco et al., 2016; Nakagawa and Spiegelman, 2017). The general director has not been able to manage human resources maximally. (Halil, Deni, & Sugiarto, 2018).

In the northern part of North Maluku, several micro plates affect seismicity in this area, namely the Halmahera, Sangihe archipelago, and the microplate in the Maluku sea. These three microplates are margins of the Eurasian and Pacific mega plates that are pressing against each other, especially the Maluku sea plate which characterizes a complex seismicity pattern as a source of enormous pressure. While in the southern part there is a fault that extends from the bird's head in the Papua region to the Banggai archipelago in Central Sulawesi. This fault is seen as a tectonic boundary between the North Maluku region which is influenced by Eurasia and Pacific plates and the tectonic area in the southern part is influenced by the Indo-Australian plate. This fault is a left-lateral fault with a strike-slip in southern Halmahera, this fault passes through several areas, namely Bacan Islands, Obi Island, and Sula Islands (Hall, 2000). The existence of Halmahera is a tectonic plate that is separated from the Maluku and Sangihe sea plates. What is evident today is that Halmahera is part of an extension of the Maluku Sea which was subducted during the Neogene period between 45 and 25 million years ago (Hillis & Muller, 2003).

The community needs to get education about earthquake mitigation because not all earthquakes cause collapses such as the Sasak traditional shelter in Lombok which remains standing after the earthquake, as is the case with the existence of button houses in Maluku and North Maluku indicating local wisdom taught by the ancestors/ancestors of the people of Maluku and North Maluku in making reliable and resilient settlements against earthquake shocks. But along with changing times and the development of civilization, many humans have built houses using modern buildings without paying attention to the layout and risk of building in areas prone to earthquakes and tsunamis because houses and buildings designed with the concept of earthquake mitigation, although they may collapse, will tend able to provide opportunities for residents to save themselves because the structure does not collapse instantly. The new paradigm of public administration is to formulate the practice of using the value of the implementation of public service accountability. (Herizal, Mukhrijal, & Wance, 2020) suggest that public policy is carried out through a planning process that has been analyzed comprehensively (Supriatna & Ibrahim, 2020).

The physical vulnerability of housing occurs due to this social vulnerability in the aftermath

of the absence of access to knowledge of the minimum building security standards. Poverty makes people unable to access earthquake-resistant technology. Institutional delays in the regions in adopting national earthquake safety regulations and standards have resulted in a vacuum of regulations in the regions regarding earthquake-resistant housing construction standards. Many regions in the district have not adopted the Building Building Law which was passed in 2002 where the capacity of the regions to adopt national standards related to earthquake resistance planning procedures is minimal. Even if there are regulations in the regions, there is often no public administration system that consistently controls safety standards for household housing and other infrastructure. The implementation of minimum standards for public services, which began in 2019, is required to include security guarantees for housing in disaster-prone areas. The logical choice is to adapt through seismic mitigation in building housing and infrastructure on earth.

The focus on mitigation and preparedness is very important, BMKG through mass media and social media needs to systematically communicate the anatomy of seismic risk in a more up-to-date but simple and understandable way to the public. In the dissemination of information in the mass media and social media, there needs to be a greater emphasis on the human dimension and "public policy". The focus is not only on earthquakes but on how to design earthquake-resistant buildings and infrastructure. That the vulnerability to earthquakes is the result of the physical vulnerability of buildings and infrastructure that collapsed on its inhabitants.

People must understand the earthquake phenomenon as a natural phenomenon that is commonplace, earthquakes are geological phenomena of planet earth. This emphasis is important because some areas of the earth are geologically dynamic. Plate shifts that cause friction or collisions between the plates at the confluence of the layers of the Earth's crust can cause earthquakes, some of which we feel on the earth's surface with all the consequences. Every year at least 500,000 earthquakes are detected on Earth, 20% percent of which can be sensed sensitively. Only 0.02% (100 earthquakes) have the potential to cause damage including casualties (in Earthquake Nation The Cultural Politics of Japanese Seismicity 1868-1930 written by Greg Clancey).

When disaster mitigation has been implemented at the policy level at the household level, conscious action that needs to be taken is to increase preparedness for the possibility of failure of shelter structures in the event of a disaster. There are always human deficiency factors, no system is perfect. Vulnerability to earthquakes and other disasters is entirely a "socio-economic policy", not for magical and supernatural reasons that people, especially local societies scattered in archipelagic areas, need to be aware that earthquakes are a normal occurrence of natural phenomena that occur in this universe.

At the end of 2018, there were 5 (five) areas affected by the tsunami issue, namely; Taliabu, Labuha, Payahe, Tobelo, and Morotai. This is of course a concern for the government because the community is in panic so that they have to evacuate independently or in groups in hilly areas due to fear and panic caused by news reports that cannot be justified.

Method

The type of research used in this research is the types of qualitative research with a descriptive approach. According to Singarimbun and Effendi (1987: 112) through qualitative methods, researchers hear and see sources speak actually (so don't be influenced) about themselves (themselves) according to their respective perspectives (perspective truth).

According to Sugiyono (2010: 15), explains that: descriptive research method is a method in

researching the status of human groups, an object, condition, thought system, or event in the present. While the qualitative research method is research based on the philosophy of positivism, used to examine the conditions of natural objects.

Based on the background of the problem, the determination of the research location was carried out in North Maluku, which is the working area of the Ternate Geophysical Station Office. Ternate Geophysics Station is one of the BMKG Technical Implementation Units (UPT) of 5 BMKG UPTs in North Maluku Province. The Ternate Geophysical Station is a technical agency that has direct links to public services in the field of Geophysics, one of which is the tsunami early warning service. Researchers also interviewed several communities regarding public services in the form of earthquake early information and tsunami early warnings.

Result and Discussion

The mechanism for Implementing Standard Operating Procedures (SOPs) for Dissemination of Tsunami Early Warning Information

Tectonically, Indonesia's territory is at the confluence of the three major active tectonic plates of the world, namely the Eurasian, Pacific, and Indo-Australian plates. The interaction between tectonic plates, besides having a positive impact in the form of trapping of mines and minerals in Indonesian territory, also has a negative impact in the form of earthquakes and volcanic eruptions. The earthquakes and tsunamis in Biak (1996), in Aceh (2004), in Palu and the Sunda Strait (2018), and the eruptions of Mount Merapi, Kelud, and Sinabung are evidence of how disaster-prone Indonesian territory is.

Realizing how many casualties/losses were caused by the earthquake and tsunami, since 2005 a tsunami early warning system has been established in Indonesia, commonly known as InaTEWS (Indonesia Tsunami Early Warning System). The purpose of establishing InaTEWS is to provide an early warning to the community if there is an indication that a tsunami threat will strike Indonesian territory. InaTEWS is a comprehensive tsunami early warning system that includes two main components, structural and culture components. Structural components are data collection mechanisms from equipment placed in the field, sending data to data processing centers, and to delivering early warnings to the authorities and the public. These structural activities, ranging from monitoring earthquakes, sea level, deformation of the earth's crust, telecommunication systems, and data processing and information communication systems.

The culture component is another part of the tsunami early warning system that regulates how the delivery of this early warning reaches the authorities and the community, the linkages between the center and the regions in the delivery of this early warning. The scope of these cultural activities starts from mitigation, preparedness, response, and capacity building in responding to tsunami early warnings by the early warning system's regular procedures to the readiness of the community itself in responding to the system. Following the inauguration of InaTEWS, November 11, 2008, the need for InaTEWS standard operating procedures which is commonly known as the InaTEWS Standard Operating Procedure (SOP) was very urgent. For this purpose, especially the Meteorology, Climatology and Geophysics Agency, as the Indonesian tsunami early warning center, has made fixed procedures that can be used as a reference for operators at the tsunami early warning information center at BMKG in carrying out their functions.

This study focuses on four aspects within the organization that tend to influence the performance of the Ternate Meteorology and Geophysics Agency about the implementation of

Standard Operational Procedures for the dissemination of this warning information on the BMKG tsunami at the geophysical station Ternate where the four aspects are communication aspects, resource aspects, disposition aspects, and aspects of the bureaucratic structure.

The clarity of information is not sufficient, the socialization process carried out by the Government is also a determining factor in the emergence of support for the implementation of the policy for disseminating information on earthquake and tsunami early warnings in the North Maluku region. The socialization process used in the outline consists of 2 ways, namely:

- a) Direct outreach process, which is carried out through seminars, field schools, interactive dialogue at RRI Ternate and limited dialogue or discussions (FGD) held jointly with BPBD and NGOs.
- b) Indirect socialization process, which is carried out through the installation of posters and signs for the early warning system in the North Maluku region from several forms of the socialization process used.

Resource Aspects

According to the results of our interview on Wednesday, February 19, 2020, the administrative coordinator (Rizal Kotu, SE) stated that:

"...Resources are one of the most important things to support the successful implementation of the earthquake and tsunami early warning policy in North Maluku. To achieve the objectives of the earthquake and tsunami early warning policy in North Maluku, adequate resources are needed so that the policy can be achieved by the stated objectives".

He also explained that:

"...In this case the resources in question are those related to HR and financial competencies. To improve the competence of human resources in the policy implementation process, the method used by BMKG is to provide education and training to employees. It can be said that education and training provided to implementing officials are quite numerous and can support the successful implementation of earthquake and tsunami early warning policies and improve the quality of public services".

Without adequate resources, policy implementation will not run optimally. Without the resources, policies will only be wishful thinking or documents on paper (Agustino, 2012).

As stated by Ratminto and Winarsih (2012: 155) also stated that providing education and training to employees has a very important meaning, which aims to improve service quality, expertise, abilities, and skills of employees. Education and training provided to BMKG employees have been given since the employee was still a CPNS until the employee has become a PNS. The types of education and training that have been given to BMKG employees consist of Structural Education and Training, Functional Training, Technical Training, Workshops, and Technical Guidance, and Online Group Discussion (OGD).

From some of the education and training that has been carried out by the Ternate City Geophysical Station to employees in the Ternate Geophysical Station environment, namely; well-executed all-natural disaster management programs and activities in North Maluku Province received the award for very good in terms of public services with a community satisfaction index above average or very satisfied.

Table 1. Types of Education and Training

Structural Training		Functional Training	
a)	PIM IV training	a)	Skilled Functional Training
b)	PIM III training	b)	Expert Functional Training
Technical Training		Workshop / Bimtek / OGD	
a)	Earthquake and Tsunami Technical Training	a)	Workshop on Upgrading the Capacity of Earthquake and Tsunami Operators
b)	Advanced Earthquake and Tsunami Technical Training	b)	Earthquake and Tsunami Mitigation
c)	The Seismotek Diklat	c)	Strong Earthquake Mitigation Guidelines
d)	Geopot Training and Time Signs	d)	Technical Guidance for InaTEWS Update SOP

However, competence or quality must also be in line with the quantity or number of operational personnel of the Ternate Geophysics Station human resources in line with what was told again by the Head of the Ternate Geophysics Station (Mr. Hermizal, M.Si), namely as follows:

"...Human resources (HR) at the Ternate Geophysical Station have several personnel who do not match the needs to reach the number of staff according to their roles, main tasks, and functions as well as workloads at the Ternate Geophysical Station, because until December 2019 there were only 15. people, while the ideal number of employees is 24 people (as shown in the table below). This is related to the moratorium policy for civil servants of the Government of the Republic of Indonesia so that the quota for additional CPNS at BMKG is also deficient".

Table 2. Information on Gap Information of Human Resources Requirements of the Ternate Geophysics Station

INFORMATION	2015	2016	2017	2018	2019**	2020	2021	2022	2023	2024
Number of Employees as of January 1	19	19	18	16	15	15	18	21	23	23
Addition										
Employee recruitment										
a. STMKG service association		1				3	1	1	1	1
b. General							1	1		
c. Movements to BMKG		1		1						
d. PPNPN			1				1			
Subtraction										
The number of employees who retire, transfer, leave, die, and others		3	3	2					1	
Number of pgs. as of December 31 (a)	19	18	16	15	15	18	21	23	23	24
Number of required employees (b) *	24	24	24	24	24	24	24	24	24	24
Employee need gap (b-a)	5	6	8	9	9	6	3	1	1	0

Then in addition to the HR competencies possessed by policy executing officials and the quantity of personnel needed by the Ternate Geophysical Station, equally important resources are financial or budget resources. The source of the budget for the dissemination of information on the earthquake and tsunami disasters comes from the APBN, whose numbers are always increasing every year.

In preparing the budget, a variety of information is needed from each member of the organization. In participation, members can convey the conditions that occur in their respective sections. Then the budget will be prepared based on considerations of the conditions that occur in a section (Young, 1985).

From this explanation, it can be seen that the collaboration carried out in the process of implementing public policies has shown the government's awareness of the benefits that the government can get in terms of funding, management expertise, as well as financial and other benefits that might be obtained from a collaboration (Parsons, 2011).

"...Not only the development of the observation system, but BMKG has also upgraded the earthquake-tsunami processing and analysis system in 2019 at the Ternate Geophysical Station. information, and will carry out an upgrade of the earthquake and tsunami information dissemination equipment in the form of the WRS DVB New Generation installation in the 2020 Fiscal Year in 3 locations, namely in Batang Dua-Ternate, Kab. Taliabu Island, and in the district. East Halmahera ", so that all districts/cities in North Maluku Province already have a system for receiving earthquake and tsunami information from the BMKG". (as shown in Figure 1).



Figure 1. Distribution of BMKG Seismic Sensors in North Maluku



Figure 2. Distribution of WRS-DVB & WRS2WAY BMKG in North Maluku

Aspects of Disposition

According to the Ternate Geophysics Station operational officer who was interviewed on Wednesday, February 19, 2020 (Taufan Taufik, S.Tr) stated that for the implementation and application of the InaTEWS system by BMKG in North Maluku Province, if it is related to the disposition aspect, are as follows:

“..... Earthquake early information as well as tsunami early warnings must have been issued by the BMKG within five minutes of the earthquake. This is very important so that rescue workers (Basarnas and BPBD) will immediately know the location of the damage and the estimated casualties in the area near the epicenter. and POLRI to take evacuation steps according to the advice and direction of BMKG ”.

He also added that:

“...After the SOP for First Tsunami Early Warning (PDT-1) was released, our task is of course to ensure that the warning message reaches the relevant stakeholders, in this case, the BPBD Pusdalops in the affected areas in North Maluku Province. And so on every time there is an update of a tsunami early warning in the form of PDT-1 to PDT-4, we will continue to ensure that the warning message reaches the relevant stakeholders while we monitor the situation in the field through reports from fellow apparatus deployed at points of interest”.

In the aspect of public services immediately after an earthquake occurs, the on-duty officer is obliged to ensure that the information from the BMKG has arrived or has been received by the BPBD Pusdalop or the official regional stakeholders in North Maluku Province, namely the Governor, Regent / Mayor, Regional Secretary and Head of Provincial BPBD. and Regency / City. However, technically this is delegated to the Head of BPBD who provides information to the Regional Head to carry out an evacuation order. Furthermore, the decision-making mechanism by the local government is regulated in a separate Standard Operating Procedure (SOP) which involves BPBD, BMKG, Kominfo, religious leaders, community leaders, youth

leaders, TNI, and POLRI.

According to the Head of Division I, the Regional Disaster Management Agency (BPBD) of North Maluku Province, Mr. Muhdi Ali, in the author's interview on Tuesday, February 24, 2020, stated that:

“...Disposition (commitment) shown by the government in early warning and disaster management can be said to be quite good. This can be seen from the inclusion of disaster management issues in the regional development plan document of North Maluku Province as well as several regencies/cities in North Maluku Province and then added by the making of several regulations related to disaster management”.

The regulations referred to are earthquake and tsunami contingency plans for Mortal Island Regency (2017) and North Halmahera Regency and Tidore Islands City (2019), however, some of the things mentioned above cannot be said to be sufficient to state that the North Maluku Provincial Government has a strong commitment. high in disaster management efforts, especially those related to mitigation and early response to natural disasters in coastal areas. The lack of high commitment as referred to is evident from the fact that several regulations have not been made, such as regional regulations regarding disaster management for special coastal areas as well as regional regulations regarding strategic planning for disaster management in other areas.

Nugroho (2012) states that making a policy is one of the most tangible forms of a region's ideology. Public policies made in a region can show how much attitude or commitment is shown by a country. In addition to this, as stated by Wildavsky (1979) in Purwanto and Sulistyastuti (2012), the amount of budget allocated to a policy or program shows how much political will the government has on the problems that the policy will solve. The amount of budget policy allocated in a policy can also be a power of attorney to see how much commitment the government has to a policy.

Conclusion

Based on the results of the analysis and interpretation of data or existing discussion, several important things can be concluded as follows:

In the communication aspect, it was found that the mechanism and implementation of the SOP policy for the dissemination of tsunami early warning information implemented by the Ternate Geophysical Station by implementing the Indonesia Tsunami Early Warning System (InaTEWS) utilizes an updated tsunami early warning communication system in the form of a Digital Video Broadcast Warning Receiver System application (WRS-DVB) based on android and direct socialization in the form of FGD, SLG, SMAB, and BMKG Goes To School / BMKG Goes To Campus so that this information can be accessed directly by regional stakeholders, stakeholders, and the community

In the resource aspect, it was found that there was a lack of human resources as a result of the civil servant moratorium policy. But this does not reduce the quality of the implementation of the SOP policy for the dissemination of tsunami early warning information implemented by the Ternate Geophysics Station because the involvement of all human resources forces when an earthquake has a potential for a tsunami so that the SOP for disseminating tsunami early warning information is carried out. Upgrading the capacity of human resources in the form of education and training/workshops / technical guidance / OGD, increased budget/finance and additional facilities and infrastructure are continuously being carried out to protect the people of North Maluku, especially from the risks and the tsunami disaster.

In the disposition aspect, it was found that there was a strong commitment between the parties involved in disaster management institutions and communities. The district/city government continues to allocate budget for disaster management activities through their respective regional budgets to carry out the preparation of earthquake and tsunami disaster contingency plans.

In the aspect of bureaucratic structure, it was found that the mechanism and implementation of the SOP policy for the dissemination of tsunami early warning information implemented by the Ternate Geophysics Station by implementing the Indonesia Tsunami Early Warning System (InaTEWS) system had been implemented by existing SOPs, namely in the form of delegation of authority to on-duty officers to release Immediate tsunami early warning information when an earthquake has the potential to cause a tsunami, considering that the golden time for carrying out community evacuation is very limited.

The implementation of the policy for the dissemination of tsunami early warning information implemented by the Ternate Geophysical Station has been carried out accordingly. This can be seen from several concepts measured as in Edward III's theory, namely communication variables, human resource variables, disposition variables, and bureaucratic structure variables (organizational implementers) above. Each of these variables becomes indicators so that they can reflect success in the implementation of public policies, in this case, the application of standard operating procedures (SOP) for the dissemination of tsunami early warning information at the Ternate Geophysical Station.

Acknowledgment

We would like to express our gratitude to the Director of Postgraduate Masters in Administrative Sciences at Muhammadiyah University of North Maluku who has provided input and support so that this research can be carried out to completion.

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