Disaster mitigation action plan: Digital media on improving accountability and community relationships

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Abstract. This study wants to address on how communication science is applied to Disaster Mitigation Plan. Especially, the implementation of Community Media and Development of Communication Technology that synergize to create a Disaster Mitigation Medium, which is appropriate for typology of Indonesia. Various levels of priorities that include disaster mitigation information, namely, increasing chain system of early warning systems, building evacuation, improving alertness and capacity to face a disaster, as well as minimizing disaster risk factor. Through this concept, mitigation actions plan of Tulungagung Coastal areas is expected to be applied in other regions in Indonesia by BNPB (Badan Nasional Penanggulangan Bencana). Having this strategy to be implemented based on region characteristics, it is expected that risk reduction process can be run optimally. As a result, the strategy is known as Community-Based Disaster Risk Reduction (PRBBK), which means as the organized-efforts by society for pra-, during, and post- disaster by using available resources as much as possible to prevent, reduce, avoid, and recover from the impact of disasters. Therefore, this result can be a Pilot Project for BNBP Indonesia, as a government decisive attitude for the next steps in protecting people residing in the region prone to natural disasters all over Indonesia.

1. Introduction

National Medium Term Development Plan (RPJMN) 2010-2014 of Indonesia proposed disaster management program as government priority because Indonesia is prone to disaster. United Nations International Strategy for Disaster Reduction (UNISDR, 2010) shows that Indonesia was ranked 12th out of 35 countries of the world's highest mortality risk threat hazard. In the same vein, National Board for Disaster Management shows that Indonesia was in the first rank for tsunamis and landslides with the highest number of casualty’s world. Possible explanations for catastrophic events cannot be separated from geographic, geological, and demographic of Indonesia [1]. Geographically, Indonesia is located on the equator, so the drought and forest fires due to droughts can occur.

Using various form of communication is a common strategy to deal with real catastrophe in Indonesia. The implementation of intense mitigation are occupying mass communication medium, such as television, radio, newspapers, and magazines, to deliver relevant news. Especially for television, its usage is intended to reach people in a rural area due to high penetration of this broadcast media. However, the effort was not without problems such as there are many distorted media coverage, which caused victims. In Sinabung, residents testified that news in media sounds too had said that mountain situation has eased, thus it encourage people to enter the villages in the red zone. As a result, a number of people died as a heat cloud swept the region on February 1, 2014. This is one example of communication failure in emergency situations, which takes many forms. Some other failures are
people’s rejection to be evacuated, confusing information, news’ errors, delays of information delivery, as well as the failure of outreach. Unfortunately, society is the victims of those failures. When communication fails, the fault entirely belongs to communicators and to a certain extent, in the medium, because both are the process of formulation and delivery of messages is determined. Thus, society as the recipient of information cannot be mistaken. Messages that fail to be delivered during an emergency are a reflection of the failure of risk reduction communication in pre disaster. Therefore, in this case, successful human rescue is determined by the success of communication. Communication is not always in the form of verbal communication, but as far as communication activities may enable humans to take necessary action to rescue.

Haddow explains the importance of media involvement both conventional and new media in the process of crisis management [2]. It refers to a great revolution of mass media has been created a new media including computer, telephone and communications network, Internet, and multimedia technologies [3]. Internet became the medium of computer mediated communication (CMC), which interactivity as its superiority. Besides, social media is part of Internet that gives people power to inform their ideas to others both in interpersonal and massive. However, there are problems that need to be solved, such as who should be trusted and how to filter information that is useful for readers [5].

Based on the use of social media that are contradictory in the crisis and the importance of helping government (BNPB and BPBD) as the pivot of disaster information to clarify the flow of information in public communication through social media, this study tries to analyze the communication network of tweets of Twitter’s users about hoax or rumor of Kelud eruption on February 13, 2014. In doing so, network analysis has been used widely in order to understand virtual world phenomenon, one of which is Woo-young and Park that identify public preferences toward national issues in Korea within blog network structure [6]. They found a communication network including sizes, density, reciprocity, and centrality.

Disaster Mitigation based on Communication Network and Communication technology, has actually been initiated by “JalinMerapi.org” and “Jangkar Kelud” that are two social movements by local community. They have managed to rescue when disaster was occured while running the principle of accountability in the distribution of disaster aid. Referring to RIK (Rencana Induk Kebencanaan) seminar by National BNPB that Indonesia is in need of disaster mitigation, especially Cultural Mitigation, which means that not only focuses on the construction and rehabilitation of infrastructure but also means reducing disaster risk by taking into account cultural aspects. This action is important because disaster mitigation that is culturally-based requires the participation of local community or local community groups who are aware of Natural Disasters.

Dukuh Sidem, a hamlet located in the southern sea area through which tsunami plate. It is located in Tulungagung that has abundant marine potential that makes Dukuh Sidem is potential to develop. In the last 2006, Tsunami has happened in Tulungagung area that includes Popoh Beach, Sine Beach, and Sidem Beach. BNPB itself has done disaster mitigation trainings regularly annually to cope with tsunami disaster as well as to educate society to be always aware of disaster. One of causes of many disaster’s victims is an unpredictable disaster. If the early symptoms of disaster can be predicted, it can help people to be on alert and avoidance. Therefore, the attempt to develop the ability of people to recognize threats, reduce vulnerabilities, and the ability to deal with threats. Disaster management is the responsibility of all parties, society as well, because the society is the first who will directly deal with threats and disasters. Therefore, the readiness of society determines the impact size of disasters on society.

Community-Based Disaster Risk Reduction (PRBBK) is the organized-efforts by society for pra-, during, and pasca- disaster by using available resources as much as possible to prevent, reduce, avoid, and recover from the impact of disasters. As the importance of this program, the entire territory of
Indonesia where is prone to disasters must implement a program of community-based disaster risk reduction. Yet, regional autonomy may be a challenge when PRBBK is simply based on administrative villages, where the cost of investment for enabling PRBBK is only project-based procurement, which are not integrated into development planning strategy. Therefore, this is a new problem in the implementation of PRBBK in Indonesia.

2. Literature Review

2.1 Disaster Communications

The term of disaster communication has not become a popular concept in the field of communication studies as well as the field of disaster. Despite, in Indonesia, disaster communication research has been conducted after earthquake and tsunami in 2014.

One important aspect in communication is the concept of reduction of uncertainty. Communication itself emerged from the need to reduce uncertainty; in order to act effectively to protect or strengthen the ego is concerned in interacting individual and group. In disaster management, accurate information is needed by public or private organizations that have concern for the victims. Communication in a disaster is not only needed in emergency conditions, but also important at the time and pre-disaster. As it is said, that communication is the best way for the success of disaster mitigation, preparedness, response, and recovery during a disaster situation. The ability to communicate messages about disasters to public, government, media and opinion leaders can reduce risks, save lives, and reduce the impact of the disaster [17]. They also stated that there are 4 major cornerstones in building effective disaster communication, namely:

a) Audience Focus: this has an objective to understand what kind of information is needed by public of the community and volunteers. Thus, communications mechanism should be build in order to ensure information is delivered with precise and accurate. The information contains messages about handling hazards, the degree of possible disasters as well as how big the scale and the impact of natural disasters.

b) Leader commitment: leadership role in emergency response must be committed to effective communication and be actively involved in the communication process. Leader’s commitment may a representative of community organizations, local leaders, or even people who are influential or opinion leaders in the region.

c) Situational awareness: effective communication is based on the collection, analysis, and dissemination of information relevant to disaster control. Principles such as transparency and effective communication are believed to be its trusted key. Regarding that, the principle of effective communication is run by well-targeted information delivery. Effective communication in the community can build trust of information they received. The information submitted must be relevant to what is happening around the region.

d) Media partnership: media such as television, newspapers, radio, and others are very important medium to convey correct information to public. Having a training to be in same page about information to be delivered in both parties is important. In doing so, the media should be managed by local community in the form of socialization region directly.
3. Methods

Moleong [7] states that research focus has two purposes: 1) to restrict the study, and 2) to meet the criteria of new information’s flow that is obtained in the field. Thus, through the focus of research, it is known what kind of data to be collected. The focuses of this study are as follows:

1. How the set of process of disaster mitigation in Sidem village
2. Appropriate community media for disaster mitigation, based on communication technology or group of people.

In order to achieve the objectives, Action Research is used in this study. Action Research Type used in this study is Participatory Action Research. According to Gonsalves et al [8], participatory action research is a combination of research and action in a participatory manner in order to improve aspects of society life. Regarding that, integration and participation among researchers, object studied by stakeholders, and other elements of society is an element that cannot be separated.

In its application, Kurt Lewin [9], which is the pioneer of using the term action research suggests cyclic step, consisting of problems identification, action planning, implementation, evaluation, and reflection. The next spiral step of Lewin that is explained by Edi Basuno et al [10] consists of a circle of planning, execution, and facts discovery for final evaluation purpose of the second step; and preparing the premises of third step, it also possible to modify the overall plan.

Participatory Action Research consists of research key principles as follows [10, 11].

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![Diagram](image)

**Figure 1.** Table disaster communication handling through community media
1. Society should be involved in the whole research process, starting from problem formulation to discussion on how to seek resolution of problems and interpret findings.
2. The research team should be a combination of all the elements that make changes.
3. The research process should be seen as part of the educational experience that seeks to build community needs and increase public awareness and community commitment.
4. The process should be viewed as a dialectical process, which shows dialogue all the time and not in the form of a static picture of a single point in time.
5. The object must be the liberation of human creative potential and mobilization of human resources for solving social problems.

In the participatory action research, relevant activities are very different from other common action research. This is because participatory action research is conducted in a more practical manner, which is adapted to society’s knowledge. Besides, documentation is a very important part, especially as reference material for society regarding commitment they have agreed among themselves. On the other hand, the interaction among community members and researchers is sustainable. Sustainability element is an indicator of a close relationship. Thus, a close relationship is an indicator of a huge opportunity for development [10].

Susceptibility in the area of Sidem towards tsunami is because of its location. It is located in the south area of Tulungagung that passed by tsunami slab. Besides, that area is a home for approximately 1000 people. Therefore, this study is expected to help society in Sidem area to practice a disaster mitigation appropriately. In order to do so, informant categorization was conducted. This categorization is based on informant’s proximity to access relevant information. First, a group of people who are agent of change including the chief of Sidem Village, the chief of institution related to disaster mitigation for Sidem area, and the member of disaster awareness group in Sidem. Second, a supported group including people who already live in Sidem for 5 years who are member of mentioned group earlier.

In this study, a researcher also acts as a facilitator. Researchers facilitate Dusun Sidem society in reviewing and implementing disaster mitigation in the village. Facilitation can be seen as part that determines effectiveness and speed of reaching an agreement in various empowerment programs. Basically, facilitators’ companion is relevant to how to facilitate society in solving and developing their potential independently [10]. The potential of disaster in the Sidem village is a potential for tsunami, since Sidem Beach is located in the southern sea area through which the plate tsunami. Thus, it requires disaster mitigation for Dusun Sidem. Disaster mitigation can be implemented by using community media of either communications technology or group of people.

4. Expected Results
Disaster is an event or series of events that threaten and disrupt the lives and livelihoods caused by both natural factors and / or non-natural and human factors that cause human fatalities, environmental damage, loss of property, and the psychological impact. Disaster has a nature of uncertain, which means that it may occur or may not occur. If disaster is occurred, severity of impact is also uncertain. Disasters can also give a trivial impact, but it may transform into a morbid, and thus, it may swallow hundreds of thousands of lives. Generally, the cause of disaster is divided into two: the consequences of natural (natural disaster) or manmade (man-made disaster). Therefore, a series of disaster relief efforts include the establishment of development policies that has risk of disasters occurred, disaster prevention, emergency response, and rehab. These are characteristics’ description of a number of disasters that often occur in Indonesia.

a) Flood
b) Landslides
c) Drought
d) Forest fires and land
e) The wind storm
f) The storm surge / tide

g) Earthquakes

h) Tsunami

i) Volcano eruption.

Having aware of the aforementioned dangers, understanding about threat of disaster, including knowledge of the following matters:

a) How does the danger arise

b) The level of possible disasters as well as how big the scale are.

c) The mechanism of physical destruction

d) Its sector and what activities will be greatly affected by disaster

e) The impact of damage, as one of the best efforts is to give knowledge to society about various disasters that might occur and its impact / consequences.

As an archipelago, Indonesia has vulnerabilities potential of the largest natural disasters, tsunami. Tsunami is a series of long waves caused by shifting plates beneath the sea, or in general is the seaquake. The speed of tsunami waves is capable of reaching 170 km / h. However, when it reached the superficial velocity, the speed may decrease but its wave is heighten. Besides, tsunami may ask for victims, damage economic activities, as well as damage the ecosystem in coastal areas [12]. In the region of South Tulungagung, especially around the area of Sidem Beach, Popoh Beach, and Sine Beach, Tsunami is one threat of natural disasters that is prone to occur. As the impact, tsunami may heavily affect the community’s economy because the majority of people work as farmers. Especially, the main impact of natural disaster can damage boats, industry sector, residence, and marine ecosystems.

Claude Gilbert proposes a summary concept of disaster [13] in three paradigms. First, disaster is the result or consequence of an external pressure. Second, as a result of social vulnerability. The last, as a result of uncertainty. This concept is in vein with opinion of Pelanda who interpret disasters as follows. First, disaster is the result of social and environmental conditions that are bad. Second, disaster is the result of collective pressure by community. Third, there was differentiation of capacity to handle damages and its negative impact. Thus, there are things to be observed which is associated with various definitions of disaster that means a perspective used to see a disaster. One of definition of disaster by Webster's New World Dictionary of the American Language cited by Porfiriev [13]. "...any Happening that causes great harm or damage; serious or sudden misfortune; calamity. Disaster implies great or sudden misfortune that results in loss of life, property, etc. or that in ruinous to an undertaking; calamity suggests a grave misfortune that brings deep distress or sorrow to an individual or to the people at large. "Dahl's Tolkovi Slovar Zhivogo Velikorusskogo Yazika (Explanatory Dictionary of The Great Russian Living Language):"Misfortune or bedstviye (disaster) is an incident, accident or other harmful occasion the resulting in losses and sorrow. Disaster is more related to the known cases of crop failure, epidemics, storms, floods. To suffer means being a disastrous disaster or dangerous situation; badly needing something; dying." Based on these two sources, it is mentioned that disaster was an event that resulted a damage, death, loss, and other severe effects, including some types of natural events that caused catastrophic. Another opinion by Maloney and Cappola [14] about disaster: "Disaster are measured in terms of lives lost, injuries, sustained, property damaged or lost, and environment degradation. Reviews These consequences manifest themselves through direct and indirect means and can be tangible or intangible." Some social scientists emphasize understanding of disaster as a social construction. Based on these experts, disaster is a result of social process or social consequences that produce hazards, or increase the vulnerability of a social system from the effects of hazard [13]. Furthermore, study concept and pragmatic about disaster by Quarantelli tries to define disaster as follows:
“a state/condition destabilizing the social system that manifest itself in malfunctioning or disruption of connection and communications between its elements or social units (communities, social groups, and individuals), partial or total destruction/demolition, physical and psychological overload suffered by some of these elements; thus, making it necessary to take extraordinary or emergency countermeasures to re-establish stability.”

5. Research Plan

The roadmap shows the target of achievement of program that will be generated based on cooperation between universities, BPBDs, as well as community groups. The expected results are in the form of disaster response technology-based application that can be applied by community. The process of disaster mitigation shows the important role of technology, especially things relevant to cultural mitigation. Having understanding of cultural mitigation, community will be able to become an independent people who understand how to address the impact and face the possibilities of natural disasters in the scope of individual and family.

6. Research Plan

The discussion above results following conclusions. Carter states that disastrous split into 5 segments, namely: Prevention, Mitigation, Preparedness, Response and Recovery. In the beginning of the segment, such as prevention, the focus of attention is the importance of prevention, an area that needs attention to do prevention, positive approach through prevention, and what resources that are needed for prevention. In this segment, Mitigation is as an action taken is usually a specific program to reduce the impact of disaster on a nation or community. Moreover, an understanding of wider implications in mitigating the impact of disaster, however, these impacts can be modified or reduced by appropriate action. Some actions or programs related to mitigation, among others: the regulation of the use of area, the regulations on the safety of high-rise buildings, control of hazard material, security transport systems for land, sea and air; development system to protect electrical installations and vital communication tool, the development of infrastructure such as the construction of highways that are not adjacent to disaster-prone areas. The third segment is preparedness. In this phase there are some important things people need as an attempt of early warning, namely: early detection is done impending disaster, early warning process should be done by the party who has the authority, thus avoiding unnecessary information, the chain of transmission of effective information, decision-making after their early warning and early
warning information dissemination to the public appropriately. Among many experiences initial reaction to the disaster mitigation, an early warning can save lives and property. Segment recovery, the recovery process can take a long time even could reach between 5-10 years or more. Post-disaster recovery usually involves various aspects such as restoration and reconstruction. In carrying out post-disaster recovery programs are indispensable involvements of various institutions, among others, as the government has the authority in terms of planning and government building of disaster management, including both central and local institutions that provide funding [15].

Disasters can result in short-term and long-term social, economic and environmental consequences with effects often felt country wide. These impacts are often magnified in small atoll island environments and have the potential to set back development gains. Recognizing the multi-faceted nature of the problem, disaster mitigation plan that is implemented in Tulungagung area is expected to be a pilot project related policies. Based on the data obtained in the study, researchers gather information related to the needs of society to mitigate the disaster. In the community in Sidem, they hold the principle of cultural disaster mitigation. People are still very adhering to the tradition that has been done from the first. Public awareness of the importance of the communication media is still very lacking, so the research team provides training for the use of communication media for the dissemination of information. Dissemination of such information requires effective communication. In this case, BPBDs Tulungagung is expected to convey information related to disaster mitigation. BPBD Tulungagung need to improve and strengthened effective communication with local Group (Kepala Desa, Kelompok Nelayan, dan Kelompok Keagamaan). Based on this research, BPBD needs to conduct effective communication is more active in using network-based media (Twitter and Fan pages) to provide important information on disaster mitigation.

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