Disaster Communication in Managing Vulnerabilities

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ABSTRACT

The management of information among various stakeholders in natural and human induced disasters is fundamental to the mitigation and effective disaster-relieve operations. Efficient information exchanges are a vital component of disaster response and relief operations. This is based on the idea that precise and timely information is made available prior, during and after disasters. Disasters always happen abruptly, and often with different levels of severity, posing a major challenge for effective information exchanges and coordination. Extended droughts, trans-boundary haze, earthquakes, floods, hurricanes, tsunamis, landslides, volcanic activities and severe weathers have created havoc and displaced populations in many parts of this continent. These events have given rise to the realization that a more strenuous attempts to uncover the emerging patterns in disaster communication. By drawing from experiences in disasters, especially in Asia, the paper firstly conceptualizes disaster, vulnerabilities and disaster communication, in the broader literature on disaster. Secondly, it examines how the emerging features, such as disaster communication and coordination mechanism, the role of social media and technology, reliability of communication systems, social capital and cultural knowledge can assist first responders, care givers and disaster related agencies in helping disaster victims more effectively.

Keywords: *Communication, cultural knowledge, disaster, social capital, vulnerability.*

INTRODUCTION

Disasters, both natural and man-made, have been on the rise in the last few decades. It is believed that more than 50 million people are living in conflict areas and another 100 million are impacted by natural disasters yearly. Between the year 1994 and 2013, natural disasters worldwide have affected some 218 million people, with 1.35 million lives lost (Center for Research on the Epidemiology of Disasters CRED, 2015). In between 1980 and 2012, the overall cost for disasters globally, in 2012 values, amounts to US$3.8 trillion (World Bank, 2013). These reports also showed significant increase in the loss of human lives and financial loss as a result of growth in population and ineffective urban planning in hazard zones, such as in flood plains or earthquake zones. Frequently, disaster tends to impact more the developing countries than developed countries – "more people die per disaster in low-income countries than in high-income countries" (CRED, 2015; Sanquini, Thapaliya & Wood, 2016).

Many countries in Asia are affected by earthquakes and tsunamis, prolonged droughts and excessive floods, radiation exposure due to nuclear power-plant meltdown, cross-border haze as a result of slash and burn activities, hurricanes and typhoons, landslides, volcanic

activities and severe weathers. These events have created devastation and displaced a large number of people in many countries. For example, the Indian Ocean Tsunami, in 2004, triggered by a 9.0 magnitude earthquake, had single-handedly caused an estimated 250,000 deaths in a single day, leaving more than 1.7 million homeless and 15 billion dollars in damages. Besides, the tsunami had also caused massive environmental and health problems. It was the most destructive tsunami in recent times, affecting some 18 countries in Southeast Asia, South Asia and parts of costal Africa (Ramalanjaona, 2011).

Besides the catastrophic Indian Ocean Tsunami (2004), the Asian continent was also beleaguered with numerous other natural calamities – Cyclone Haiyan (2013) in the Philippines caused 7,354 deaths; Cyclone Nargis (2008) in Sri Lanka claimed 138,366 lives; in the 2008 Indonesian earthquake some 5,778 people lost their lives; Japan's earthquake and tsunami in 2011 claimed some 19,846 lives; the recent 2015 Nepal earthquake also caused the death of some 8,000 people and the figure goes on (ADB, 2015). These are only the number of fatalities, in reality, many millions more were directly and indirectly affected by these natural disasters, not to mention the huge loss in damages.

Disasters happen unexpectedly, with different levels of severity, posing a major challenge for effective information exchanges and coordination. In disasters, lives are shattered for good, livelihoods are ruined and people are displaced, with many unable to return to their pre-disaster normal lives – a situation that posed a huge socio-psychological challenges to the victims. The impact is not only for the victims – the victims' families, friends, the first responders and the caregivers are also confronted with very undesirable situations. The colossal nature of these disasters has given rise to the realization that disaster communication and management strategies need to be more concerted and effective.

These strategies will greatly assist in the management of vulnerabilities, and help to reduce the impact of disasters on lives and social systems. In such context, decisions made through ethical basis may have important and long-lasting impressions on the communities served. The management of information among various stakeholders in natural and human induced disasters is fundamental to the mitigation and effective disaster-relief operations. The process of communication during and in the immediate aftermath of a disaster is a vital part of response and recovery, as it connects disaster victims with first responders, support systems, and other family members. As such, dependable and accessible communication systems are crucial to a community's resilience (The Associated Press and NORC, 2013).

CONCEPTUALIZING DISASTERS, VULNERABILITIES AND DISASTER COMMUNICATION
a) Disasters
Scholars have defined disaster from different angles in different periods of time. Developing a definition of disasters contributes to better understanding of its theory and methodology. In the initial decades, disaster research was normally left to implicit or partial analysis of a disaster phenomenon. There exist numerous glossaries regarding disaster and related terms and concepts. In attempting to collate key disaster related terms, Thywissen (2006, 2010) and Marre (2013) found out that there exist many definitions for the word disaster. Al-Madhari and Keller (1997) and Quarantelli (1985) also claimed that, in the absence of an accurate and consensual definition, research in disasters has become problematic. This difficulty arose out of the usage of this term in different professional backgrounds. Other scholars stressed the necessity for

standardization of definitions to offer a steady structure for the reporting of events, collection of data and plan (Mayner & Arbon, 2015).

Scholars, such as Carr (1932) recognized 'a disaster as a product of its consequences'. He argued 'if the walls withstand the earthquake and the dam retains the water, there is no disaster.' Instead, he views disaster as the 'collapse of the cultural protections' (Carr, 1932). The implied description suggests that disaster is any incident that produces substantial negative and undesirable consequences. This may result from incidents in the natural environment (such as earthquakes, floods, and severe weather events), incidents related to technology, and incidents related to war and violence (Dombrowsky, 1981; Perry, 2007). Other scholars like Quarantelli (1982) have started to move away from this approach, by distinguishing disasters from other events (such as civil disorders and wars) (Barton, 1963; Quarantelli, 1966). Quarantelli (1982) was among the first to question the 'practice of defining disasters by surface characteristics of the agent.' Other scholars like Charles E. Fritz (Fritz, 1961, 1968) and Barton (1963) started to view disasters as a social problem.

For the purpose of this article, the authors adopt the contemporary definition offered by the International Federation of Red Cross and Red Crescent Societies (2017). Disaster is defined as an abrupt and calamitous incident that seriously disrupts the functions of a community or society. Such incident usually causes massive loss of human lives, his belonging and to the environment, which surpasses the community's capacity to manage using its own resources. Disasters can be caused by nature and human actions. A disaster is said to have occurred when a hazard impacts vulnerable people. 'The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster' (International Federation of Red Cross and Red Crescent Societies, 2017).

b) Vulnerability
Recent studies on disasters have shifted slightly from an 'agent centered' approach to focus on 'vulnerability'. In defining vulnerabilities in disasters, Boris Porfiriev (1998) argues that disaster is an event which destabilizes the social system, by which normal systems fail to function, and it necessitates an intervention to restore normalcy. Through this lens, disaster is seen as transition or change that contains vulnerability and requires different configurations of social interaction. According to Alexander (1993), natural disasters can be assumed as events with substantial impacts on the natural environment and the socio-economic system. Disasters essentially involve the interface between a risky physical occurrence and a vulnerable group of human population. As such, a disaster can be approached not just as an event, but as human vulnerability towards facing environmental threats and extreme hazardous events.

In these definitions, the hazard-origins of disasters are now examined from social perspectives, mainly from vulnerability and resilience discourses. Quarantelli (2005) claims that disaster scholars should first examine social systems, since they are the actual cause of vulnerability. He claims that in disasters, vulnerability manifests in the form of weaknesses in social structures and systems. Quarantelli (2005, p.345) accentuates that 'neither an event nor a physical place or time as relevant to disasters.' He claims that the whole conception is social in nature – 'vulnerability is socially constructed by relationships in the social system and disasters are based on the notion of social changes' (Quarantelli, 2005, p.345).

In this context, and for the purpose of this article, vulnerability is thought of as the diminished ability (either by individual, group or community) to anticipate, resist, cope and recover from the negative effects of a natural or man-induced hazards. Vulnerability is most regularly linked with poverty, but then it can also emerge when 'people are isolated, insecure and defenseless in the face of risk, shock or stress' (International Federation of Red Cross and Red Crescent Societies, 2017; Geale, 2012). The exposure to risk varies because of one's social group, ethnicity, gender, or other identity, age and other defining factors. Poverty can also be a defining factor in vulnerability – poor people's housing may be more susceptible to disaster threats. Further, their awareness and capacity for disaster preparedness may be lacking, and this may result in slower response to a disaster (Perry, 2007).

On the other hand, offsetting vulnerability requires conscious attempts to increase capacity. This could be achieved by lessening the negative impact of the hazard where possible through activities that increases disaster preparedness, prediction and warning and mitigation. These initiatives help to build capacities in communities to endure and cope with hazards. It also helps to tackle the root causes of vulnerability, in the likes of 'poverty, poor governance, discrimination, inequality and inadequate access to resources and livelihoods' (International Federation of Red Cross and Red Crescent Societies, 2017; Geale, 2012).

c) Disaster Communication
One of a crucial challenge in responding to natural and man-made disasters is communication. Communication during and in the aftermath of disaster is a vital aspect of response and recovery initiatives. Thorough communication disaster victims connect with first responders, support systems and other family members. As such, having a dependable and accessible communication and information systems also are vital to a community's resilience (The Associated Press-NORC Center for Public Affairs Research, 2013). This importance was clearly highlighted in disasters such as Hurricane Katrina and the 9/11 terrorist attacks (Dwyer, 2006; Lueck 2005; Thompson 2005).

Many disaster scholars have recognized a substantial rise in the demand for information on both affected and unaffected communities in disasters (Ferrante, 2010; Reynolds and Seeger, 2005). In fact, it would not be an understatement to say that there is a frenzy to seek information from surviving victims, their family and friends, and interested stakeholders such as the various disaster response agencies. Therefore, to satisfy the demand for information, often people seek information from the mass media, persons who seem to have authority, local government authorities or other community members as the main source of information during disaster response phase (Johnson, 2007; Gultom, 2016).

However, one can argue the validity of information provided by the community members. Austin et al. (2012) and Johnson (2007) suggests that community members lack the mechanism to aggregate and authenticate information, thus such communication cannot be automatically recognized as formal. Therefore, these information lacuna generates demands for continual organizing, monitoring of credibility, and added verification, so that to establish and disseminate reliable disaster communication for the information seekers (Gultom, 2016; Palen et al., 2010; Palen & Liu, 2007). Nonetheless, according to Johnson (2007) information seeking is likely to have a positive result through engaging local individuals as sources of information, compared to mass media. In situations when information appears in bits and pieces, scarce, or

even botched, affected communities are inclined to merge and join with others as their reliable information sources (Romo-Murphy et al., 2011).

In disasters, trustworthiness of information is essential for effective disaster response actions. Affected people rely on information that they perceive as trustworthy. It is unlikely that they will pay much attention and act on certain information given by someone they lack trust in – a situation that will avert the transformation of the given information into usable knowledge (Fisher, 2013; Jaeger et al., 2007; Sandman, 1993; Ferrante, 2010; Uslaner, 1999). Therefore, in disaster communication, the trust and trust building is a necessary pre-requisite for prompt decision making in crisis situations (Murayama et al., 2013; Reinhardt, 2015). Trust helps to increase the worthiness of the information in the eye of the affected people, and in increasing the whole quality of the communication process, and in the efficiency of information seeking process (Johnson, 2007; Tang et al., 2012).

Usually in disasters, humanitarian agencies (many of international origins) play critical roles, not only in providing material and socio-psychological support to affected persons, but also provide vital specialized technical support to local teams in disaster rescue initiatives. However, due to the foreign origin and perhaps for the lack of knowledge in local knowledge, customs and sensitivities humanitarian agencies frequently face problems in creating trust within the affected community (Borgatti & Halgin, 2011; Harvard Humanitarian Initiative, 2011). Developing trust is a long-term and enduring process that requires a relationship with the targeted groups of people. However, disasters do come unannounced, and humanitarian agencies usually go into the disaster affected areas shortly after a disaster has occurred, often without much knowledge about the target communities that they are dealing with. Thus, to bridge this knowledge gap, these humanitarian agencies ought to involve local support agencies, as they will be better suited to identify suitable local knowledge to quicken the process of trust building (Antonovsky, 1987; Widén-Wulff et al., 2008).

EMERGING FEATURES IN DISASTER COMMUNICATION

Disasters require multiple modes and intensities for communication. Communications must take place in a matrix of interactions, it should be multifaceted, moving in numerous directions, between and among support agencies, humanitarian agencies, first responders, support staff, the victims, families and friends, and the media. When disasters occur, usually unannounced, there should be adequate and accurate communication about the disaster that has just occurred. Since the disasters have an immediate local impact, the communications regarding the disasters should start locally. When disasters happen, the emergency calls are made to local emergency services, such as the police, fire-brigade, ambulance, and local authorities. Information is communicated in a complex maze among victims, eyewitnesses, families and friends, and authorities.

In a disaster event that happens abruptly, communication systems can be heavily paralyzed, while the need of communication becomes swiftly overwhelming, and in most cases, outstrips the capability to generate instantaneous response. In such situations, communication should be handled in a prioritized manner, dispatching and receiving information to relevant agencies (such as rescue and safety units, disaster-related agencies and other stakeholders and personnel). This process should also trickle down with the same intensity within those agencies,

so that information is clearly shared with their people for effective actions. Of course, this complex web of communication needs to be coordinated to avoid further chaos in disaster areas. As is usually the case, centralized coordination of information or a central information process is usually difficult to function effectively in such situations.

However, such coordination is crucial, especially when there is a need to warn people at events such as floods or spreading fires, which may warrant evacuations. Employing communications, the public need to be advised periodically through advisories on events such as 'an electrical grid failure or prolonged power outage, when boil water orders might need to be issued, or to remind people not to use generators or power cleaners, indoors or near open windows, to avoid carbon monoxide poisoning, after a tropical storm, earthquake, or flood' etc. (Jacoby, 2017). For disasters that happens with adequate warning time, 'such as tropical storms, hurricanes, typhoons, and cyclones, or even for tsunamis following a distant earthquake, weather reports and advisories would communicate who, when and how residents should prepare, who might need to evacuate, who is at risk from flooding, and to where people should go to shelter' (Jacoby, 2017).

i) Incident Command Centers (ICCs) and Emergency Operations Center (EOC).
Much of the organized communication in disasters usually occurs within the Incident Command Centers (ICCs) or the Emergency Operations Center (EOC). The ICC/EOC is a standardized and systematic approach to the management of command, control, and synchronization of emergency response by providing a shared hierarchy within which responders from many agencies can be effective (FHWA, 2017). In these centers, 'communication might be done by direct face-to-face meetings, by notes sent via runners, or by radio, preferably encrypted to keep secure information from the media and the public' (Jacoby, 2017). In most cases, a predesignated agency would have been made responsible to coordinate disaster management efforts, usually at localized levels, and at each level of government. The ICC/EOCs will have at their disposal, resources required to deal with disaster at their level. Usually a predesignated disaster communications methodology would have been put in place.

ii) Social Media and Technology in Disaster Communication
Social media channel communication is every so often the only mode of telecommunications medium that survives the impact of disasters. As shown in recent disasters throughout the world, the use of social media such as phone call (usually mobile lines), Short Messaging Systems (SMS), Facebook, Twitter, email has been on the rise during disasters. People use these platforms to send and receive information on a variety of aspects regarding the disaster. More traditional modes of communication, such as landline phone may be used, if the communication infrastructure still be intact.

For example, the October 17, 2013 forest fires in the Blue Mountains, New South Wales destroyed and damaged several hundred houses, and several hundred students were trapped in their schools in Winmalee as the fires spread. Many of the residents relied on their mobile phones to get fast and reliable information. The NSW Rural Fire Service used a smartphone application called *'Fires Near Me'*, downloaded nearly 200,000 times during the crisis, and at the peak of the fire, its Facebook page recorded over a million views per hour. Its Twitter soared from 20,000 to 37,000 followers. Essentially, these platforms assisted to alert people regarding

rescue instructions and danger areas. Now, social media are making available opportunities to network and engage with people during a disaster, through disseminating related information and gathering the posted information (The Conversation, 2015).

As such, during disasters social media platforms are inundated with information, going towards a multitude of directions and levels. Disaster response personnel who were used to one-directional (top-down) information dissemination mode, are now confronted with massive amounts of information from the public and usually before formal notifications are issued. Such situations warrant the emergency response personnel to get used to a multi-directional information sharing scenario. Generally, there are four types of social media used during disasters. Firstly, the innovative user – the one who improves and adjusts social media for his or her special circumstances. Secondly, the reactive user – the one who tries to respond and assist the affected population using social media for the first time. Thirdly, the responsive user – emergency responders who use social media tools frequently, but make use them more intensely during disasters, and finally the proactive user – emergency organizations that employ social media tools to encourage preparedness, and leverage them during emergencies (Phys.Org, 2015).

iii) Reliability of Communication Systems

Natural disasters frequently destroy the infrastructure and network systems of communication like the transmission towers and cables, base stations, electricity supply, transportation systems and other facilities – resulting in a collapse in communication. The structure and location of telecommunication equipment such as the transmission towers make them susceptible to natural disasters. When these physical infrastructure gets damaged, communication becomes a major obstacle in disaster affected regions. The isolated location of these structures, makes it difficult for these structures to be restored quickly. Communication also get hampered during disasters due to network overload and congestion, 'most of the people try to communicate with others and overload the available communication bandwidth' (Menon, Pathrose & Priya, 2016, p.4).

Reliability is an essential aspect of disaster management communication systems, as these systems may be deployed in remote regions, and at times not accessible by the usual communication modes, especially in areas like deep oceans and mountains. Sometimes, emergency rescue operations in events such as forest-fires, avalanches and landslides and others, occurring in isolated settings, rely heavily on the durability and reliability of the communication system – it ought to be in working condition always. Accordingly, wide area network with satellite signals is generally recommended. With the arrival of satellite communication, the difficulty of connectivity to remote and isolated areas is now better managed. Through the use of one or more satellites, a large area can be covered in great detail. For example, Low Earth Orbit (LEO) satellites that orbit around the earth at low altitude, can provide the facilities of remote sensing.

Communication through satellite radio is also made possible with this technology, and plays a key role in disaster management. Satellite aerial photos have the ability to reveal with great detail, the severity of the disaster zones. This technology is not only for disaster management but also for disasters forecasts – meteorically departments use this technology to

forecast possible calamities. Wireless communication modules such as the Motorola VHF models, Codan NGT SRx and Portable Repeater system VHF can be used to provide communications in the surrounding the area of the disaster (Asian Disaster Management News, 2007; SADKN, 2009).

iv) Social Capital in Disaster Communication
Social capital is the web of relationships between people living and working in societies, which enables societies to function and evolve. In the field of social science, social capital is often defined as the norms and networks that enable people to act collectively (Portes, 2000; Bhandari, 2014). According to Robert Putnam (1993, 2000), social capital is the features of social organizations, in the likes of norms, networks and trust that enable action and cooperation for shared benefit. The simple notion of social capital is that an individual's family, friends and acquaintances are vital assets that can be relied upon in times of crisis (Portes, 1998, 2000). It is believed that 'those endowed with a diverse stock of social networks and civic associations are in a stronger position to confront poverty and vulnerability, resolve disputes and take advantage of new opportunities' (Woolcock & Narayan, 2000; Bhandari, 2014).

The OECD, looks at social capital as networks of shared norms, values and understandings, which facilitate cooperation within or between groups. Networks can be thought of as real-world links between groups or individuals, friends, family networks, networks of former colleagues etc. It suggests three kinds of social capital links; firstly, *bonds* – the links people create based on a logic of common identity ("people like us") – such as family members, close friends and persons who share our ethnicity and culture. Secondly, *bridges* – the links that go beyond a shared sense of identity, for instance distant friends, co-workers and associates, and thirdly, *linkages* – the links to people or groups further up or lower down the social ladder (OECD, 2017).

Therefore, social capital suggests some kind of social empowerment that kicks-in in the quest for information during and in the post-disaster period. Studies of disasters have shown that social capital has been used to better comprehend how populations at risk employ the available resources to address the pressing needs in a disaster (Brouwer & Nhassengo, 2006; Bhandari, 2014). There are data to suggest that decentralized decision-making using social networks, employing trust and reciprocal normative behavior, have contributed to increased effectiveness in disaster response initiatives (Neal & Phillips, 1995; Bhandari, 2014). Studies have shown that that communities categorized by higher intensities of human, physical and social capital, appear to be better prepared to face and manage flood events (Buckland & Rahman, 1999). Physical capital, according to Bhandari (2014), includes tangible assets like disaster search and rescue equipment, information technology capacities and monetary resources that will help to support communities at risk. Whereas human capital refers to the quality of manpower, which includes their level of skills, education and their health status.

Trust is a key feature of social capital dynamics in disaster situations. Trust is needed when vital disaster information appears from personal resources, and is elevated into the collective attention of groups of people (Widén-Wulff, 2008). Thus, this need highlights that social capital rooted in the personal relations of an affected community encourages trust building in that community (Harvard Humanitarian Initiative, 2011). The social capital of communities experiencing disasters can help in promoting trust and community involvement in

communication. This position concurs with Putnam (1995), who states that the features of social networks, defined through social capital, have a positive connection with trust formation, voluntary participation, and cooperation among group members for their shared benefit.

v) Culture on Disaster Communication
Knowledge about cultural dynamics and sensitivities helps to promote social resilience in the face of disasters. Through disaster experiences, vital infrastructure has been more resilient to withstand calamities, human behavior in disasters are often more difficult to control, more so, in situations where people continue to occupy and settle down in hazardous regions. Thus, it is important to understand the socio-cultural worldviews and behaviors of people in the management of disasters. In reality, inculcating a culture of resilience may support to avert unnecessary victims and losses. Hence, culture should be viewed as a pool of beneficial resources and not as a hindrance (Warner & Engel, 2014). Aspects of culture are reservoirs of resources and assets, which could be used to cope with disasters. As alluded by Engel (2014), people are endowed with a cultural-mix of 'knowledge, beliefs, values, norms, techniques and artefacts,' which assist them to engage and 'manage their physical, natural and man-made, and social environment'. Furthermore, cultures also incorporate certain skills such as problem-solving approaches that have shown to be useful to survive in a certain environment.

Cultural beliefs regarding disasters and how to embrace calamities are often culturally defined. For example, compared to other natural hazards, aspects of risk perception and disaster-response behaviours in volcanic events, appear to be more closely linked to cultural beliefs (Gaillard, 2008; Lavigne et al., 2008; Donovan, 2010; Gultom 2016). In most cases, such beliefs are often not in-line with the scientific and technical reasoning provided by the authorities (Dougall et al., 2008; Harvard Humanitarian Initiative, 2011; Donovan et al., 2012). Often, in disasters, communities are more prone to embrace community-generated knowledge built on cultural rationality, built over time (Dougall et al., 2008). Therefore, in many cases, communities may disregard the occurrence of actual disasters. Not fully understanding this scenario, the authorities prefer to focus on scientific and institutional approaches to disaster management, often ignoring public sentiment (Sandman, 1993). Many disaster scholars disagree with this approach. They suggest that cultural values ought to be considered by the authorities in order to increase trust and lessen outrage in disaster (Guion et al., 2007; Romo-Murphy et al., 2011; Veszteg et al., 2015; Gultom, 2016).

To illustrate the points raised in the discussion, Gultom (2016), researching community-based disaster communication and trust building in the Mt. Merapi volcanic region, in the island of Java, Indonesia, offered several interesting findings. She found that most the people who residing on the inclines of Mt. Merapi is a Javanese ethnicity and speak the Javanese language. They observe the Javanese culture and traditions, develop close community kinships, and so does the local community radio stations, which broadcast culturally strong local content (Gultom, 2016). However, as observed by Lavigne et al. (2008), Donovan (2010), Donovan et al. (2012) and Butt (2014), these cultural beliefs have shaped a sense of fearlessness, creating false discernment of volcanic risks, and frequent reluctance to heed the official warnings to evacuate. They argue that despite the adverse effects on risk perception, the Javanese culture appears to have a positive relationship with trust in disaster communication. In the 2010 Mt. Merapi

eruption, using local Javanese language in disaster communication was effective, as the affected communities understand the language (Gultom, 2016).

Besides the language, the Javanese beliefs regarding disaster play an important part of disaster communication. It was cited that there is a certain level of discrepancy between the local wisdom and the official disaster approach, mainly pertaining to evacuation instructions. Local people have been unwilling to follow the official evacuation instructions since their local knowledge of volcanic mythologies suggest a different assessment. With regard to eruption, there are certain precursors that can be observed. An eruption should be preceded by events such as earthquakes, lightning, and abnormal behaviour of wild animals. Since the precursors did not occur, they assume that the volcano will not erupt yet, thus no immediate need to evacuate (Gultom, 2016). It is also interesting to note that the communities living on the slopes of Mt. Merapi have developed a 'culture of embracing hazard', by conceptualizing that the hazards from volcanic activities happen for their benefits (Dove, 2008). For these communities, volcanic eruptions are not destructive. Instead, the volcanic outputs provide the communities with fertile soil for better agriculture, leading to better livelihoods. As such, comprehension of cultural rationality and wisdom of communities at risk is necessary in communicating information during disasters. For example, in the Mt. Merapi case, in understanding the local resentment to evacuate, the authorities highlighted that the reason for the evacuation was for Mt. Merapi to have 'extra workspace' to restore its nature. This method was more likely to be successful to reassure communities to evacuate because such an action would be in-line with their cultural knowledge, which is to live in harmony with nature (Gultom, 2016).

CONCLUSION

Communication problems are pervasive in all disaster situations. Researches have shown that all disasters register some kind of communication problems. It can be external communication with the victims and the public, and communicating internally between emergency response personnel and the related agencies. As shown in the earlier discussion, disruptions to communications systems, infrastructure and electricity supply will greatly hamper effective response and recovery, and other disaster support efforts. Although many disasters are unavoidable, the impact and sufferings can be reduced by putting in-place suitable information management and dissemination systems, and early warning systems about pending disasters. Timely dissemination of precise and comprehensible disaster warning to populations at risk and to relevant disaster authorities may possibly minimize loss and damage. In addition, communities living in disaster zones must have access to all-weather communication equipment during disaster. First responders and civil protection committees at various levels should be equipped with several modes of communication, which include faxes, email satellite radios and VHF Radios and telephones. Should one system fails, one can rely on other systems for communication. Other initiatives should comprise adequate training to personnel who operate the receivers and ensure that the public is properly informed regarding emergency contact numbers, possibly through mobile networks. Coordination among disaster stakeholders such as relief agencies, NGOs, government agencies and humanitarian agencies is crucial to ensure effective disaster relief efforts. Thus, great emphasis should be placed on ensuing effective channels of communication between these stakeholders.

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