Communicating Risk in Enhancing Disaster Preparedness: A Pragmatic Example of Disaster Risk Communication Approach from the Case of Smong Story

Alfi Rahman\textsuperscript{1,2} and Khairul Munadi\textsuperscript{2}

\textsuperscript{1}Faculty of Social and Political Sciences, Syiah Kuala University, Darussalam, Banda Aceh, 23211, Indonesia, alfi.rahman@unsyiah.ac.id
\textsuperscript{2}Tsunami and Disaster Mitigation Research Center (TDMRC), Syiah Kuala University, Banda Aceh, 23233, Indonesia

Abstract. Communicating risk has been widely accepted as a key strategy in mitigating the impact of disasters. The concepts and practices of risk communication have been evolving since the 1980s due to the complexity and diversity of risk, developments in the communication sciences, and the complex nature of stakeholders and media. Failure to communicate risk may lead to an increase in the number of fatalities in future events. In this study, disaster risk communication (DRC) is proposed based on Lasswell's communication model and seen as an interactive process of exchanging information and opinions about risk among individuals, groups, and institutions to help them reduce uncertainty and undertake appropriate decisions and actions in the event of disaster. This study also describes the case study of the Smong story, which was successfully used to convey a simple tsunami risk message and help people make appropriate decisions, undertake appropriate actions, and save lives during the 2004 Indian Ocean tsunami. It involves multiple factors, such as messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions, or reactions to risk or to legal or institutional arrangements for risk management in strengthening community preparedness before, during, and after disasters.

Keywords: Disaster Risk Communication; Smong Story; Community Disaster Preparedness; Tsunami Preparedness

1. Introduction
The frequency at which disasters have occurred in recent years has had significant impact, with numerous lives lost as well as serious damage to infrastructure, the economy, livelihoods, etc. Disasters have affected more than 200 million people [1] worldwide, and this number will most likely increase in the future. Before the 2004 Indian Ocean tsunami, disasters were considered unavoidable acts of God or punishment for people's sins. People accepted disaster more passively. Since the tsunami, Disaster Risk Reduction (DRR) efforts have been constructing and promoting a comprehensive approach to disaster management; however, disasters are still perceived as unavoidable events that humans are powerless against and must accept as their destinies.

Before the 2004 Indian Ocean tsunami, disaster studies tended to focus on the crisis and emergency stages. Since then, it has been realized that disaster studies should also consider comprehensive factors such as population growth, urbanization, environmental degradation, climate change, etc.\cite{2}.
The high number of fatalities in the 2004 Indian Ocean tsunami was attributed in part to a lack of preparedness in communicating risk [1]. For example, the tsunami revealed weaknesses in communicating risk and warning systems that could have saved people's lives, while the 2011 Japan tsunami revealed flaws in perceptions and preparations [3] when most people thought they were already situated in safe places.

The worst effects of disasters have been discussed widely in literature, and efforts have been made to prepare communities by introducing structural and non-structural mitigation efforts. In recent years, research into risk communication as related to natural hazards and disasters has also attracted increased attention. Researchers have suggested communicating risk through community preparedness as a more effective means of dealing with the effects of disaster [4,5]. However, most DRC strategies have been constructed based on a limited assumption that views the public as passive and commonly perceives the message as being one-way, without any chance for response.

The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 highlighted the importance of communicating risk in encouraging disaster preparedness for effective response [5]. More specifically, there are correlations between risk communication and efforts to increase community disaster preparedness. For example, Comfort et al. (2010) define community disaster resilience as a result of communities' capacity to effectively communicate and manage risk as well as respond to and recover from the disaster [6]. As such, an important component that should be considered in achieving disaster community resilience is how disaster risk communication efforts can contribute to community risk preparedness.

Recently, disaster risk communication has been widely accepted as a key strategy for reducing the worst effects of disasters. The concepts and practices of risk communication have been evolving since the 1980s due to the complexity and diversity of different risks, developments in communication science, the complex nature of stakeholders, increased media technology, and abundance of information that can easily be accessed by individuals [7]. Failure to communicate risk may increase vulnerability.

The 2004 Indian Ocean tsunami was a turning point for Indonesia in reducing risk. Indonesia's disaster paradigm changed into a comprehensive and preventive approach [6]. Three years following the tsunami, the Indonesian government established a regulatory and institutional framework for DRR through the Law 24/2007; this was followed by the establishment of the National and Local Disaster Management Agency [7,8]. The Indonesian disaster paradigm started moving from emergency response to a more comprehensive DRR approach. Since then, the Disaster Management Agency has taken a leading role in reducing risk.

Information related to disaster risk that is commonly received by communities is generated by the Local Disaster Management Agency (Badan Penanggulangan Bencana Daerah, BPBD), Non-Governmental Organizations (NGOs), and academia. In fact, there are many types of risk information that should reach various audiences. Efforts to reduce the worst impacts of disasters have been introduced in many ways by researchers and practitioners in the field of DRR. The efforts produced vary based on their creators' backgrounds. For example, disaster education researchers and practitioners suggest that disaster education should be implemented through formal and non-formal education at every level, and that structural mitigation is a main factor in helping communities be more prepared to deal with future disasters.

Communication efforts have been conducted, studied, and improved over many years to help planners include strategic factors that contribute to community resilience based on all available resources [4].

In this study, disaster risk communication (DRC) is defined as an interactive process of exchanging information and opinions about risk among individuals, groups, and institutions [7] to help them reduce uncertainty and make appropriate decisions and take appropriate actions in the event of a disaster [9]. It involves multiple factors, such as messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions, or reactions to risk messages or legal/institutional arrangements for risk management. These strategies also strengthen community preparedness.
2. Purpose
The purpose of this study is to introduce a pragmatic conceptual framework of DRC for community disaster preparedness. This study also describes a case study that was successfully used to convey a simple tsunami risk message and helped people make appropriate decisions and take appropriate actions to save lives during the 2004 Indian Ocean tsunami.

3. Methods
This research is a qualitative study which begins with a review of disaster risk communication discourses. It uses data from literature reviews, interviews, and a case study. The framework is constructed on the understanding and analysis of various recent discourses related to DRC in enhancing community disaster preparedness. This paper also presents as its case study the Smong story from Simeulue Island. Interviews were conducted in September 2017 and January 2018 and based on a parallel research study by the authors on disaster risk reduction in Simeulue Island.

4. The Importance of Disaster Risk Communication
Disaster studies now hold that human perception, knowledge, and values can contribute to disaster preparedness and are fundamental in increasing community disaster resilience. Individuals, groups, or communities make choices whether or not to spend money on mitigation measures despite knowing the potential implications of not making enough effort. Ignorance of the effect of disaster is also a major problem that can occur. This situation can occur due to the lack of quality information on disasters that can help them make appropriate decisions and undertake appropriate actions.

From this point of view, Disaster Risk Communication (DRC) takes on an important role. The main purpose of DRC is to increase the quality of future decisions and actions in the event of a disaster. When discussing DRC, it should be accepted as an interactive and dynamic process in which information and opinions are exchanged between individuals, groups, and institutions. This situation involves multiple factors, not only risk, but also include culture, mental attitudes, opinions, and reactions to risk messages [10,11]. The current approach to encouraging preparedness is ineffective, and a new method of communicating risk is needed.

DRC is believed to help people see the big picture of risk through community preparedness [12]. To optimize the effectiveness of disaster preparedness, a plan should be put in place to manage the flow of risk messages. DRC programs should be integrated as much as possible into larger, comprehensive efforts that address and influence multiple elements.

Disaster risk management is not entirely new to DRR efforts. Academics and practitioners have long recognized the benefits of such DRR efforts as disaster education, as well as the use of local resources for DRR; this may include, for example, using local and indigenous knowledge for DRR and disaster risk assessment (see Figure 1).

Unfortunately, most DRR efforts seem separate from each other. It is difficult to see links between these efforts. In fact, studies have shown that most communities lack the capacity to prepare for future disasters. In other words, DRR efforts have been improved but, in the process, communities have lost still more of their capacity to mitigate disaster [13]. Communities have their own styles of risk management, based on the resources that they can potentially have [14,15].

The main function of DRC is to extract information or messages from major DRR efforts and deliver them to target audiences (see Figure 1). DRC is a means of extracting risk messages from many resources, framing them into DRC plans, and spreading them through communities.
In achieving public disaster preparedness, Coppola (2009) emphasizes the importance of three stages of DRC: (1) early planning, (2) developing campaign strategies, and (3) implementing and evaluating campaigns [4]. This suggests that DRC plans rely on comprehensive planning, which is the foundation for formulating the flow of risk messages.

The DRC framework of this study is used to describe the process of developing a relationship between audiences and communicators and delivering specific messages created by the communicator. Communication science has great potential to advance disaster preparedness efforts.

5. Results
Lasswell's communication model theory is commonly known as "who says what in which channel with what effect?", and is considered by researchers in the field of communication [16] as an adaptive model that explains the flow of communication. Lasswell's communication model also includes consideration of a variety of factors for determining the impact of communication.

So, the DRC framework in this study is constructed based on Lasswell's communication model for several reasons: (1) interactive; this model gives communicators the opportunity to create risk messages based on risk planning, (2) multiple messages; it allows a communicator to create multiple risk messages, since the available information is interpreted in more than one way according to appropriate applications and channels, (3) multiple channels and specific target audiences; multiple media can reach multiple target audiences with very specific messages, (4) concern for the effects of the process, which could give the opportunity for the DRC plan to set goals.
The DRC framework of this study needs a certain amount of planning, based on the flow of a message from the sender to the target audience. DRC framework proposes and involves planning and strategy development, and is divided into five elements (see Figure 2), as follows:

- The first is to identify the role of the sender with the authority to create risk messages. The sender or communicator should also be concerned with the planning strategy development. The communicator has the authority to identify target audiences and set objectives based on specific target audiences. A series of assessments should also be done objectively, such as by a disaster management agency that is mandated to formulate risk messages.
- The second concerns the risk message or risk content developed from various resources.
- The third concerns the channels or media that transfer the risk messages to the target audiences.
- The fourth concerns to the target audiences who receive the risk messages to facilitate them making the right decisions and taking the right actions before, during, and after disaster.
- The fifth and the final element focuses on measuring the impact of the DRC plan on resilience.

The model is also concerned with the various channels chosen to deliver the risk message to different target audiences. The effects of the DRC are broken into three main categories: (1) cognitive (person’s belief or opinions about risk), (2) effective (person’s feelings about risk), (3) behavioral (person’s behavior related to risk) [4].

To plan DRC, this framework provides several steps that should be considered: (1) determine the purpose and objectives of DRC; (2) analyze the target audience; (3) develop the DRC messages; (4) determine the proper media or communication channels; (5) set a schedule; and (6) put all of these pieces together into a comprehensive plan.

A DRC framework helps the public focus its efforts and ensure all are involved in assessing, communicating, managing, and integrating risk throughout the entire range of disaster risk reduction efforts. This framework also concerns the impact of globalization, which could affect public perception and knowledge by enabling access to varied and unlimited information. People should also have the skill to select related information [17].
6. The Case of the Smong Story in Transmitting Tsunami Risk Messages and Saving Lives during the 2004 Tsunami in the Simeulue Island, Aceh, Indonesia

Simeulue Island is located in southwestern Aceh and has been hit by tsunamis in 1907, 2004 and 2005 [3,19]. Because of this situation, the Simeuluean people have created their own knowledge related to tsunamis, called Smong, as a way for dealing with these disasters. An example of the traditional implementation of disaster risk communication from the case of the Smong story could be seen in Table 1.

Table 1. A pragmatic example of disaster risk communication from the case of the Smong Story in saving lives during the 2004 Indian Ocean tsunami

| Disaster Phase | Who? Communicator | Say what? Message | In which channels? Medium | To whom? Receiver or Target Audiences | With what effect? |
|----------------|------------------|-------------------|--------------------------|--------------------------------------|------------------|
| Pre-disaster   | • Person who experienced the 1907 tsunami  
• Person who received the Smong story from the person who experienced the 1907 tsunami | • Story of the 1907 tsunami  
• A big earthquake followed by receding seawater, the seawater reached the land | Nafi-nafi (Storytelling) | • Children  
• Adults | Increasing the tsunami preparedness |
| During disaster | • Person who received the Smong story from the person who experienced the 1907 tsunami  
• Disaster Management Agency  
• BPBD, NGOs (international, national, and local level)  
• Related stakeholders.  
• Community groups  
• Local leaders | • Smong story content in the Nafi-nafi  
• Older persons took the role of delivering the tsunami warnings | Messages delivered through the community action | • Saving lives  
• Three people were killed |
| Post-disaster   | Success of the Smong story in saving lives has inspired others. | Encouraging them to reach other channels such as books, films, pamphlets  
Other traditional channels such as Nandong | All community members and related stakeholders, institutions, etc. | Increasing awareness that the Smong story should be passed to the next generation. |

Source: Rahman et. al (2017, 2018) [13,18] and interview results (November 2017 and January 2018)

The Smong story successfully saved many Simeuluean people from the 2004 Indian Ocean tsunami. Only three of the island's 70,000 residents were reportedly killed in the tsunami [18,20]. Smong knowledge is contained in traditional oral stories, known as Nafi-nafi. The success of the
Smong story’s risk message content is clear from the appropriate decisions and actions of the Simeuluean people during the 2004 Indian Ocean tsunami [13,18,21–23].

The Smong story community contains common knowledge on tsunami risks that existed before the 1907 tsunami but failed to save lives at the time. Since then, the Smong story has resonated through the Simeuluean community, and it worked well in 2004.

The Smong content in Nafi-nafi has been recognized by most Simeuluean people. It tells about: (1) tsunami phenomenon; if the big earthquake occurs, following by the receding of seawater, the seawater will reach the land, (2) the action should be taken when seeing this phenomenon: run away from coastal areas or flee to higher places/mountains, (3) transmission of the story across generations.

According to a former Simeulue Regency leader, the simple message of the Smong story has been accepted and maintained through the common memory of the Simeuluean people. He added that, because the 1907 tsunami killed more than 50% of Simeulue's population at the time, it made the Smong story resonate in the Simeuluean people's collective memory.

However, many scholars argue that we need to be aware of and guard against the potential erosion of indigenous community knowledge. For example, during the longtime conflict between the Free Aceh Movement (FAM) and Indonesian Armed Forces, the Smong story was transmitted through traditional channels and reinforced by the earthquakes that occurred frequently.

7. Conclusion
This study forwards a pragmatic conceptual framework of DRC for enhancing disaster preparedness. This framework's underlying assumption is that DRC can increase community disaster preparedness. It should be integrated through all DRR efforts. The critical function of DRC is planning, implementing, exercising, and evaluating efforts to help people make appropriate decisions and take appropriate actions during disasters, and should be combined with other strategies.

The Smong story proves that a clear and simple message can contribute to increased community tsunami preparedness. It shows that a simple message and the right traditional media can help the community make appropriate decisions and take appropriate actions when disaster occurs. The next stage of this study is to apply the framework in a practical situation to ensure the flow of risk messages from sender to target audience.

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