

CHAPTER 5

Theories and Models of Risk Communication and Disaster Studies

Risk Communication Studies

A critical prerequisite to effective disaster management is the minimization of related impacts through communication of risk information in a timely manner, and in a format that all stakeholders can understand. Attaining this mandate can be a major challenge for disaster managers, especially in an increasingly globalized world characterized by higher levels of multi-culturalism as increasing numbers of people migrate to locations outside their culture-zones where, not only language differs, but also perceptions of and attitude towards hazard/disaster risk (Martin, 2003). The challenge for disaster managers is therefore to design effective tools/strategies that not only span language differences, but also take into consideration cultural perceptions and attitudes so that the objectives of disaster risk-reduction can be achieved.

Risk communication studies in the context of disaster management may involve different theories and models to describe, predict and test a multitude of variables and interacting agents and it may apply to any of the three (3) risk phases: *preparedness, response* and *recovery*.

Sheppard et al. (2012) has presented a report to the US Department of Homeland Security which is a useful guide for emergency managers and communicators involved in risk communication and disaster management. It summarized and categorized relevant theories and models as follows: 'The first set labeled as "cross-cutting theories and models" are overarching approaches that demonstrate the complexity of the relationship between a message and its impact and how this message is affected by both the communicator and the intended audience. These are applicable to the preparedness, response and recovery phases of risks:

(1) the Crisis and Emergency Risk Communication (CERC) Model that focusses on identifying the most exigent publics; the Situational Theory of Publics (STP) aims to help institutions and organizations identify whom they should consider their publics and understand why these publics communicate and when they are most likely to do so;

(2) the Heuristic-Systematic Model allows the communicators to see and understand the connections between a person's desire for accurate and sufficient

information and the motivation for processing the information;

(3) the Deliberative Process Model consists of three steps to understand the areas of divergences and the potential for convergence among stakeholders and various publics: First, elicitation of values and criteria by stakeholders' groups; Second, provision for performance profiles for each policy option of experts and Third, the evaluation and design of policies by random sample of citizens.

Similarly, the authors also enumerated some of the theories and models that specifically applies to a particular event phase.

For the Preparedness Stage, five (5) theories/models were presented: the Actionable Risk Communication highlights the effectivity of the community members over public officials in sharing information of what actions to take to guard themselves from risks. Prompting risk reduction behaviors are effective when preparedness information comes from multiple sources, uses varied channels and frequently repeated. The Mental models, on the other hand, help assess publics' understanding of risks to capture the gap between their risk assessment vis-à-vis those of the experts and find areas of convergence and divergence. Affect heuristics explains how people make risk decisions based on what they have previously experienced and how they analyze situations, while,

Theory of Reasoned Action and Planned Behavior stresses that people determine if they will do something oftentimes based on their own views and of the society. The Risk Information Seeking and Processing (RISP) model emphasizes information sufficiency to identify differences between the individual's perceived current knowledge and the knowledge needed to appropriately mitigate risk. This model combines Theory of Planned behavior with Heuristic-Systematic model. If specific for the Response Stage, two (2) theories were identified that caters to the organizational response to events: the Image Restoration and Repair highlights focus on efforts to address organizational image, while, the Situational Crisis Communication Theory (SCCT) focusses on crisis management of the organization. Finally, the authors had three (3) models for the Recovery Stage : the CAUSE model aims to address and bolster public confidence after a disaster/risk event; the Precaution Adoption Model to address the audience's information needs to help elicit desired behavioral responses by publics; the Social Amplification of Risk Framework (SARF) that highlights the social context that encompasses factors that may amplify or attenuate the risk involving four stages : risk event, amplification, ripple effects and impacts. Finally, the Systems Dynamic model examines how communication can increase or reduce the secondary effects of an event (Sheppard et al., 2012).

Similarly, Lindell and Perry (2004) synthesized the literature on the theoretical frameworks on risk communication towards disaster studies captures the different areas covered by a disaster cycle in the context of risk communication studies encompass social influence (emphasis on source-message-channel-receiver-effect elements), behavioral choice focuses on cognition and perception studies), protective action (theories that link cognition with behavior processes) and innovation processes (attribution of behavior on innovative products and services) which shows that there is a wide variety of theoretical perspectives that can provide useful accounts of ways on which risk communication influences disaster response and hazard adjustments.

Moreover, some literature on studies of risk communication and disaster risk reduction management deal with the emerging field of complex adaptive systems (Comfort et al., 1999; Comfort & Kapucu, 2006; Comfort et al., 2004; Comfort, 2007) which Comfort and Kapucu (2006) refers to as the role of inter-organizational systems in public administration and organizational theory. In addition, Comfort and Kapucu (2006) synthesized the literature on this concept which is a broadly interdisciplinary literature as supported by the findings from the studies of Prigogine and Stengers (1984), Kauffman (1993), Holland (1995), Axelrod and Cohen (1999) which emphasized that reliable performance of information

functions under stress is a critical factor in achieving coordination among a large and varied group of actors engaged in crisis and disaster response. This performance depends on three major areas: the technical structure; organizational policies and procedures and willingness to adapt to the context of the situation (Comfort et al., 1999).

On the other hand, some models were also employed specifically to address the complexities of disaster management and factors that affect its success or effectivity. For this particular area of studies, some of the relevant disaster risk studies models are highlighted in the next section.

Disaster Risk Studies Models

Disaster risk studies have been instrumental in eliciting possible risk reduction strategies that involve communication. Khan et al. (2008) discussed that Disaster Risk Management (DRM) includes the sum total of all activities, programs and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses. The three key stages of activities that are taken up within disaster risk management (refer to Figure 1) are as follows: Pre-disaster phase is before a disaster and the activities in this stage are taken to reduce human and property losses caused by a potential hazard. For example, carrying out awareness campaigns, strengthening the existing weak

structures, preparation of the disaster management plans at household and community level, etc. Such risk reduction measures taken under this stage are termed as mitigation and preparedness activities. Disaster occurrence is during a disaster which include initiatives taken to ensure that the needs and provisions of victims are met, and suffering is minimized. Activities taken under this stage are called emergency response activities. Post disaster is after a disaster wherein initiatives taken are in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected communities, immediately after a disaster strikes. These are called as response and recovery activities.

On the other hand, the Disaster Risk Management Cycle (DRMC) diagram (refer to Figure 2) highlights the range of initiatives that normally occur during both the Emergency response and Recovery stages of a disaster. Some of these cuts across both stages such things as coordination and the provision of ongoing assistance; while other activities are unique to each stage e.g. Early Warning for preparedness; Evacuation during Emergency Response; and Reconstruction and Economic and Social Recovery as part of Recovery. The DRMC also highlights the role of the media, where there is a strong relationship between this and funding opportunities. This diagram works best for relatively sudden-onset disasters, such as floods, earthquakes, bushfires, tsunamis, cyclones but

is less reflective of slow-onset disasters, such as drought, where there is no obviously recognizable single event that triggers the movement into the Emergency Response stage. In all the stages of the cycle, communication plays a vital role at different levels and with specific objectives.

The above-mentioned theories and models highlight the significant contribution of communication in disaster management and a valuable strategy for risk reduction. However, effective communication alone cannot address the need for building community resilience. Another critical factor is the identification and recognition of the social vulnerability of the community so as to contextualize the messages to be crafted for specific situations and audiences.

Social vulnerability models

The concept of *social vulnerability* recognizes the role that human systems and people's behavior and decision-making play in vulnerable conditions. It refers to all factors or properties of the human system including resilience, coping strategies and recovery from a disaster (Alexander, 2012). Wisner et al. (2012) proposed the Crunch Model of Disaster (see Figure 3) which classifies social vulnerability as root causes; dynamic pressures; fragile livelihoods and unsafe conditions. Social vulnerability is influenced by risk communication and gaps in risk communication translates into gaps in risk perception and

deficiencies in disaster preparedness and adaptation strategies (Stewart & Rashid, 2011). Elwood (2009) and Muffet-Willett and Kruse (2009) both viewed that systems or processes aims to simplify specific problem by isolating the major influencing factors (although at the expense of other factors). By so doing, they aim to enable their users to predict how systems or processes will behave as those pre-selected criteria alter. They are limited as they do not fully represent reality, and their effectiveness degrades as social phenomena are included. However, these are helpful in facilitating understanding, and highlights the following areas as well:

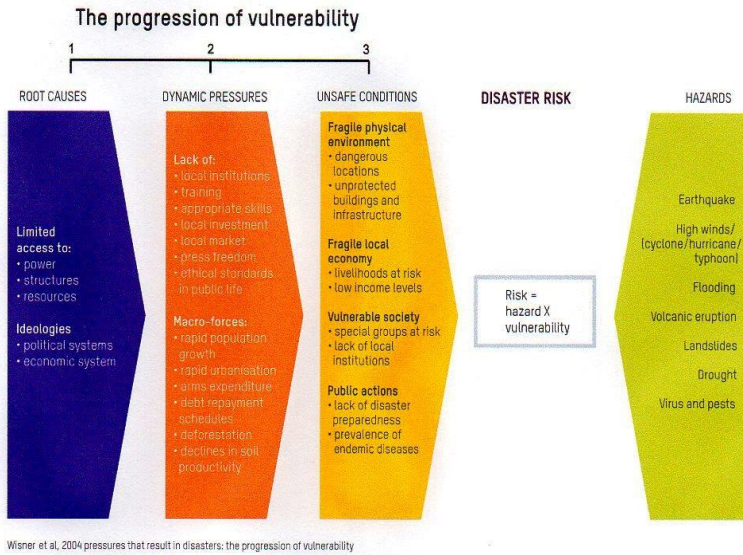
- “unsafe conditions” may be: poor housing conditions, dangerous location, risky livelihoods, lack of disaster preparedness skills, etc.

- “dynamic pressures” may be: no community organization for collective efforts to reduce flood risks, rapid migration tendencies that change the social structure, the lack of local markets for small farmers to sell their produces or buy agricultural inputs, etc.

- “root causes” may be: government negligence of sand mining in that river, the lack of government policy on flood warning systems and land use planning, poor men and women are not allowed to attend meetings on flood mitigation and emergency response preparedness.

Figure 3

The Crunch Model



Similarly, various studies on modelling risk communication have emphasized the role of transforming concepts into frameworks that are easier to operationalize (O’Neill, 2004; Reynolds & Seeger, 2005; Demeritt & Nobert, 2014) as well as developing information simulation model addressing mixed cultural societies (Clerveaux et al., 2009) and highlighted the dynamics of communication. Other models emphasized the role of protection motivation (De Boer et al., 2014), protective action decision model (Lindell & Perry, 2012) as well as social vulnerability models (Berkes & Ross, 2013;

Alexander, 2012) to emphasize the role of culture and social-ecological concerns to disaster risk reduction and management. A couple of studies have been documented in relation to the Davao City flashflood incident of 2011. Estacio (2013) made a study documenting the methods used by the local barangay unit in the post crisis phase of the disaster. Her study employed the Coombs' 3-Phase model, the Diffusions of Innovation Theory and Trish Center Scholars' Crisis Management Cycle. Results of the study revealed the organizational learning of the barangay from the disaster were transformed into strategies that can be utilized in preparedness and recovery stages of their disaster management process. On the other hand, Sanchez in 2014 looked into the IEC strategies and programs for the residents' risk management and precautionary practices towards flood incidents using the Precaution Adoption Process and Berlo's Communication models. Results of her study show that communication plays a vital role for the residents' risk awareness and preparedness on disasters.

Systems Theory Approach

The literature on disaster and risk reduction studies revealed that a Systems Theory approach has been found to be useful in studying the elements of disaster management. This is guided by the Structural Functionalism paradigm which seeks to discover the functions of the different elements of a social

system to perform as one whole system. Since this approach sees society as a social institution and that as a complex system, it has social structures and social functions. Social structures referring to the social interactions and behaviors, while social function refers to the mechanisms involved in the existence of such social structure (Green, 2009). Systems Theory can be applied to governance and organizational analysis, sustainability analysis focusing on the interdependence of elements of social systems for long-term survival and accounts for the emergence of adaptation to the environment (Kemp et al., 2005).

Incidentally, systems theory is a transdisciplinary study of the abstract organization of phenomena, independent of their substance, type or spatial or temporal scale of existence and is also fundamental to organizational analysis and the dynamics of interrelationships. Communication as an integrated process is also guided by the systems theory in analyzing the dynamic process and the interdependent relationships of its elements as a multidisciplinary study from a holistic approach (Littlejohn, 2001; Infante et al., 1997).

Modern examples of *structural functionalist-oriented* research were observed in the study of the post September 11, 2001 attack. As the American culture was disoriented due to the attack, a shift in American travel customs was observed. There was a change in policy, thus, stricter scrutiny of travelers was

implemented which included new protocols like removal of shoes, belts and rejection of liquids on board. Thus, changing the practices in travel protocols. Moreover, studies on modern technology that changes the landscape of communication, i.e. video conferencing in business meetings replaced the face to face meetings, thereby losing social interaction's role in the structure.

The Social Amplification of Risk Framework (SARF)

Kasperson et al. (1988) states that the Social Amplification of Risk Framework (SARF) is a phenomenon by which information processes, institutional structures, social group behavior and individual response shape the social experience of risk, thereby contributing to risk consequences. It viewed hazards interact with psychological, social, institutional, and cultural processes in ways that may amplify or attenuate public responses to the risk or the risk event. Amplification occurs at two stages: in the transfer of information about the risk, and in the response mechanisms of the society. Signals about the risk are processed by individuals and social amplification stations, including the scientists who communicates the risk assessment, the news media, cultural groups, interpersonal networks and others. Key steps of amplification can be identified at each stage. The amplified risk leads to behavioral responses that in turn result to secondary impact. The framework explains why

and how certain risks attract public concern and become either heightened (through amplification process) or lessened (through attenuation process). Greiving et al. (2006) regarded this framework as an integrative framework that captures risk perception (Duckett & Busby, 2013) and social systems (Oinas-Kukkonen et al., 2010) which examine public risk perception.

Figure 4

Social Amplification of Risk Framework of Kasperson, et al., 1988)

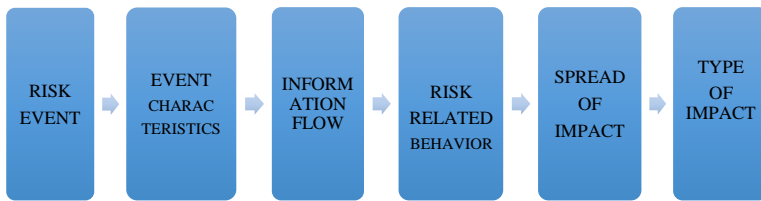


Figure 4 shows the amplification process starting with the risk event, that is, flooding in urban area. Its characteristics captured in communication messages and relayed to the target audience through the agencies and persons involved specifically those in authority. The communication signals will then form into messages transmitted to a specific target audience where receivers will respond to the risk information. These will now transform into “amplification stations” through communication and elicit responses. Ripple effect happens as the impact spreads to different groups, thus, creates

a wider area of coverage. Finally, different types of impact can be the outcome of the amplification.

Communication theorists introduced Kasperson et al.'s Social Amplification of Risk Framework (1988) based on the concept that risk communication is usually developed by experts and hazards interact with the psychological, social, institutional and cultural processes that may amplify public responses to the risk/risk event (Comrie et al., 2019; Kasperson, 2001). Thus, risk perception influences risk-related behaviors, hence, amplified risk leads to behavioral response (Hocke-Mirzashvili, 2006; Machlis & Rosa, 1990). This framework, therefore, links the technical to psychological, sociological and cultural perspectives to highlight the “gaps” (Kasperson, 1986). Moreover, Relator (2016) emphasized that amplification of risk event is anchored by the communication process, transmission of signals from sources to the transmitters down to the receivers. Message is formed through a cluster of signals that are decoded by the receiver to understand the complete thought of the message. The transmitters intensify or attenuate the signals through altering, adding or deleting some of it.

The social amplification of risk framework (SARF) has been used and adopted by many studies and 1076 citations have been reported through Crossref (Kasperson et al, 1988). Significantly, these studies found SARF to be useful in

analyzing risks which systematically integrates risk assessment with the psychological, sociological, and cultural perspectives of risk perception and risk-related behavior. These studies have shown the influence of the social amplification of risk in the field of risk communication research. Risk researchers have developed it as integrative and coherent framework for the empirical inquiry of risk and risk communication recognizing the role of the “amplification stations” and its “ripple effects” in terms of its impact and reach as well as the understanding of risk perception towards risk-related behaviors (Kasperson, 1986; Kasperson, 2001; Pidgeon et al., 2003; Renn, 1991; Renn, 2011; Renn et al., 1992; Relator, 2016). Other studies utilized SARF by operationalizing the social amplification using a systems approach in some communication tools like Twitter for risk events to capture the perceptions of professionals in health organizations regarding the use of Twitter during risk events (Comrie et al., 2019); public health amplification of disease-related information; social responses as an outcome of social amplification (Renn et al., 1992) and public experience of risk amplified by the stations (Machlis & Rosa, 1990).

On the other hand, SARF also acknowledges that there are interdependent factors that predict the risk-related behaviors such as physical consequence of the risk event, amount of amplification, risk perception, socio-economic and political impacts which links risk perception to social response

and that these are strongly related to exposure to risk than the magnitude of its physical impact (Renn et al., 1992; Relator, 2016; Comrie et al., 2019). Moreover, the framework is also useful in analyzing how the social amplification of risk shaped risk perception of flood-prone communities in Taiwan (Chiang, 2017) as well as the significant role of social amplification in strengthening resilience among retailers in urban industries in flood-prone communities in the riverbank region of Kaohsiung City (Ling & Chiang, 2018).

In addition, SARF's concept of the framework recognizes the significant role of interactions, linkages and boundaries as it also includes the assessment of multiple actors, the information and inter-organizational processes which calls for a system analysis approach. Kasperson (2001) stated that responses to "threats" depend on the social amplification of environmental risk, which sends signal to the society about the seriousness of risk and the extent of its damage. Various management strategies, therefore, are involved for preventive and precautionary intervention which requires the interplay of the political culture, public values, and role of industry and nature of regulatory system which calls for adaptive management strategies. This was reinforced by the findings of his earlier study in 1986 which recognizes the role of the differences in risk perception, credibility and trust, timing of program, technical and analytical resources, roles of public

involvement and some limitations that may affect public participation. Moreover, Renn (2011) utilized SARF and concluded that human beings perceive risk being a threat to their well-being and the magnitude of its impact is co-determined by values, attitudes, social influences and cultural identities as such behavior to risk is greatly affected by the intensity of the societal concern and action as reflected by the role of the institutions, the flow and reach of its communication.

Researches in risk reduction management have been known to use varied methods which are greatly dependent on the objective of the risk communication study: case study, network analysis, experimentation, models and framework development towards disaster management. Mixed methods approach is also used combining the qualitative with quantitative analyses of data.