Chapter 18

Information Communication Technology and a Systemic Disaster Management System Model

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ABSTRACT

This paper presents some aspects of the ‘communication’ processes within a Systemic Disaster Management System (SDMS) model. Information and communication technology (ICT) plays a key part in managing natural disasters. However, it has been contended that ICT should not be used in ‘isolation’ but it should be seen as ‘part’ of the ‘whole’ system for managing disaster risk. Further research is needed in order to illustrate the full application of the ICT within the context of the developed model.

INTRODUCTION

Recent natural disasters have demonstrated the vulnerability of countries to such events. Also, past disasters have shown that their impact can be reduced significantly by taking adequate planning, preparedness and mitigation measures. A great deal of effort has been made, by academe, international organizations, and governments, practitioners, to investigate and develop approaches to address disaster risk (UN/ISDR, 2004; UNDP, 2004; McEntire, 2001; Lindell et al., 2007; Paton & Johnston, 2001; Moe & Pairote, 2006; Kurita et al., 2006; Aldunce & Leon, 2007; Kazusa, 2006; Jayawardane, 2006; Wilson, 2000; Iannella & Henricksen, 2007; Banipal, 2006).

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On the other hand, information and communication technology (ICT) may be regarded as a key player in the process of disaster management. A number of studies and research has been conducted on ICT in relation planning, preparedness, mitigation, response and recovery (Murai, 2006; Kara-Zaitri, 1996; Mansor et al., 2004; De Silva, 2001; Quarentelli, 1997; Showalter, 2001; Billa et al., 2004; Brunn, 1995; Fedra & Reitsma, 1990; De Silva & Eglese, 2000; Johnson, 2000). For example, Showalter (2001) has examined articles published between 1972 and 1998 on remote sensing in hazard and disaster research. The review has found that the technique has been primarily used to detect, identify, map, survey and monitor existing hazards and/or their effects. Also, the author argues that remote sensing may help to provide damage assessments, improve planning, or provide data for mitigation, preparation, relief, response, and warning efforts (Brunn, 1995; Showalter, 2001). Moreover, remote sensing for a tsunami early warning system has been made possible by the use of existing technologies, such as radar, telemetry, telecommunication satellites, etc (Gonzalez et al., 1998). Other authors have conducted research on GIS and argue that it provides the primary advantage of displaying the critical information related to an incident on maps, satellite images, digital terrains (Billa et al., 2004; Fedra & Reitsma, 1990). Also, ICT technologies (e.g., Multimedia, CD-ROM, DVD, Internet, Web Sites and e-mail) are being applied to demonstrate how emergency planners may more effectively accomplish their mission to educate the larger community on a variety of issues such as the need to adopt proposed mitigation strategies, to respond to disaster warnings and evacuation suggestions (Fischer, 1998). Furthermore, ICT plays a critical role in facilitating the reconstruction process and in coordinating the return of those displaced by disasters to their original homes and communities. Disaster management activities, in the immediate aftermath of a disaster, can be made more effective by the use of appropriate ICT tools. These include tools for resource management and tracking, communication under emergency situations (e.g. use of Internet communications), collecting essential items for the victims, and national and international fundraising (Wattegama, 2007).

Following the 2004 Indian Ocean tsunami, the Asian Disaster Preparedness Centre (ADPC) and the International Telecommunication Union (ITU) have taken initiatives to study the current situation of emergency communications in the Asia-Pacific countries (Wattegama, 2007). Moreover, it is believed that assessments have been conducted in countries such as Bangladesh, Maldives and Sri Lanka on these emergency communication systems. The ADPC under the Indian Ocean Early-Warning System programme also introduced the Tsunami Alert Rapid Notification System Programme (TARNSP) with emphasis on robust ICT systems to disseminate information and warnings from the national to the community level (Wattegama, 2007).

Given the above, it may be argued that ICT cannot guarantee success in saving lives when used in ‘isolation.’ For example, it has been argued that had a tsunami early warning system (EWS) been operational in the Indian Ocean, the human toll might only have been a fraction of what it was (UNDP, 2005). It has been argued here and elsewhere (Santos-Reyes & Beard, 2010) that this may not be necessarily the case; an EWS should be seen as a component or part of a ‘wider system’; i.e. a ‘total disaster management system’. Moreover, an EWS may work very well when assessed individually but it is not clear whether it will contribute to accomplish the purpose of the total system; i.e. to prevent fatalities. For instance, a regional EWS may only work if it is well coordinated with the local warning and emergency response systems that ensure that the warning is received, communicated and acted upon by the potentially affected communities. It may be argued that without these local measures being in
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