ENHANCE THE DISASTER MANAGEMENT PROCESS THROUGH SOCIAL MEDIA

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Abstract
Disasters endure the economic and human losses emphatically around the globe in each year. Impacts of disasters are expeditious in the last decade due to the insufficiency of existing traditional Disaster Management (DM) tools. Social media as an internet-based platform and it is used as a critical tool for effective communication during emergency situations. This proposed research is mainly considered on Facebook and Twitter in terms of social media. Because, during the literature review and the preliminary expert interview, it is identified that the use of Facebook and Twitter is very much higher in Sri Lankan context compared to other available social media. Social media discovered as a vital factor to enhance DM in all over the world. To refer, Social media demonstrated its value as a viable complement to Indonesia's comprehensive disaster information management system for governments, by informing the public and creating public value through its communication speed, reach and information quality. However, the use of social media is not extensively explored in the Sri Lankan context. Hence, this research focuses on enhancing the natural DM in Sri Lanka and improve the quality of assistance provided to people related to natural DM through the use of social media.

A comprehensive literature review has been carried out to investigate the concept of social media and its relationship with DM. The literature findings contributed to develop the conceptual model pertaining for the study which highlighted that social media can be used in almost all stages of DM to enhance the process. This conceptual model will be used to develop the framework representing the method of social media application for natural disaster management in Sri Lanka. The use of social media for DM has number of benefits such as real-time communication, low level of capital investment requirement, provides useful situational awareness, early warning and supports the psychological well-being of disaster victims. However, limitations such as violates social policies, affects the social customs, quality and veracity of information could be compromised, and monitoring of accuracy of information transmission is complex were also reviewed from the study.

Keywords: Disasters, Disaster Management, Social Media, Sri Lankan Concept

1.0 Introduction

Disasters are celestial intervention in disguise. It is an extreme level of destruction and adversity that affects the social fabric emphatically (Rautela, 2006). A proper DM is required to safeguard from such disasters. Traditionally, DM was based on predetermined disaster plans while they were insufficient (Lauras, Benaben, Truptil, & Charles, 2013). Hence, Hartama et al. (2017) and Lauras et al. (2013) stated that, issues involved in the traditional DM systems (DMS) can be resolved through the incorporation of new information technologies. Nowadays, the DMS is in the pinnacle of popularity in DM which has incorporated information technologies in order to improve the DM (Lauras et al., 2013).

However, these techniques are only effective up to certain level. To refer, warning alarms will disseminate the massages to the nearest affected places only. Even though several modern techniques available for DM, challenges regarding them are inevitable too (Reyes, Corona, & Peña, 2010). Pathirage et al. (2012) argued that, those challenges need to be managed appropriately in order to consummate future disasters successfully. Recently, researchers have drawn much attention on social media as it is identified as one of the major solutions for the enhancement of DMS (Chik, 2011). Kim et al. (2016) explained the social media as an internet-based platform and it is used as a critical tool for effective communication during emergency situations. Also, Kim et al. (2016) demonstrated that, social media is potentially vital to enhance the effective communication in DM, as it promotes the information sharing and dissemination in a rapid manner.

The Government of Sri Lanka was not effectively assimilated with natural disaster management, prior to the Indian Ocean tsunami on 2004 (Careem, Silva, Silva, Raschid, & Weerawarana, 2007). In addition to the above statement, requirements of an effective national DMS for Sri Lanka also emerged as an

important concern after the tsunami disaster (Disaster Management Centre [DMC], n.d.). Disaster Emergency Warning Network (DEWN) is the first mass alert Early Warning System (EWS) in Sri Lanka, inaugurated by the DMC together with Dialog (Dialog, n.d.). Though, the idea of integrating social media with the DM could be an effective process, it is not highly focused in Sri Lanka (Kodippili , 2014).

Accordingly, this paper is aims to enhance the natural disaster management in Sri Lanka through the social media by recommending a framework representing the method of social media application for natural disaster management in Sri Lanka This paper is structured as follows. First a discussion on the disaster, DM and social media is given in detail. Then it is followed up with Sri Lankan context of DM and the use of social media in DM. through this discussion, the need for the social media in DM in Sri Lankan context and the importance of this paper is validated.

2.0 Disasters

2.1 DEFINITION OF DISASTERS
Disasters are damaging events that end in requirement for a good vary of emergency resources, to help and make sure the survival of the stricken population (Geale, 2012). McEntire (2014) defines disasters as hazard which overwhelms and causes imbalance to the human's magnanimity. In fact, disasters can happen without any prior notice and can be classified as a dangerous and catastrophic incident, which devastates and disrupts infrastructures (Salamati Nia & Kulatunga, 2017).

2.2 TYPES OF DISASTERS
According to Shaluf (2007), disasters can be categorized mainly into three types such as natural, man-made and hybrid. Natural disasters are, catastrophic event caused by natural causes, where humans cannot control, whereas man-made disasters refer to non-natural violent upheaval that can be an abrupt or more long-term (Shaluf, 2007). Shaluf and Ahmadun (2006a) explained, disasters which occurred due to the combination of both human error and natural forces as hybrid disasters. Among the three types of disasters such as natural, man-made and hybrid, natural disasters carry major consideration in depth in this proposed study. Because, Natural disasters have become inevitably important issue in urban areas (Hartama et al., 2017).

3.0 Disaster Management

3.1 DEFINITION OF DISASTER MANAGEMENT
Disaster management (DM) is defined as a whole process which is related with planning and responding to disasters, including pre-disaster and post-disaster activities (Shaluf & Ahamadun, 2006b). DM process is a combination of administrative decision making, the operational procedures, the actors and technologies that integrate with each phases of disasters (Lettieri, Masella, & Radaelli, 2009). In addition, this process also encompasses the risks and consequences of disasters as well (Shaluf & Ahamadun, 2006b). Natural disaster management is a kind of a cured process which diminish the curses of a community because of these devastated natural disasters, relative to its pre-disaster condition, as much as possible (Chatfield & Brajawidagda, 2013).

3.2 STAGES OF DISASTER MANAGEMENT AND ITS EVOLUTION
According to the study of Moe and Pathranarakul (2006), DM includes five phases such as prediction, warning, emergency relief, rehabilitation and reconstruction. However, McLoughlin (as cited in Hartama et al., 2017) stated that, preparation, response, recovery and mitigation are the four main stages established for DM operations. Preparation refers the preparedness activities like early warnings which are designed to give a proper alert prior to the destruction and to ensure that organizations and communities are ready to respond to disasters in a timely and effective manner (Chatfield & Brajawidagda, 2013). While in the response stage evacuation has been carried forward combined with sudden activities like search and rescue to provide emergency assistance to victims (Hartama et al.,

2017). Recovery can be done as a short term or a long-term recovery process to indemnify the victims who are affected by the disasters to at least their pre-disaster situation (Chatfield & Brajawidagda, 2013). Mitigation is the process which includes the activities that are undertaken in the long-term time period between two disasters where one has gone with much destruction and the other one is yet to come and designed to prevent emergencies and reduce damage caused by emergencies (Hartama et al., 2017). Khan and Ali (2001) pointed out the stages of DM as prevention, mitigation, preparedness, response and relief, rehabilitation and reconstruction. However, Levinson and Granot (2002) summarized these stages of DM as warning, impact, emergency and recovery. Shaluf (2008) endorsed the statement of McLoughlin, however, the terms used for the interpretations of stages is used as preparedness, mitigation, recovery and response.

3.3 FACTORS AFFECTING DISASTER MANAGEMENT

Develop a framework of technique for evaluating the influence of natural disasters in a systematic manner is imperative (Hashem, et al., 2016). By doing a proper forecasting on these threatful natural disasters accommodated with an effective DM process, we can reduce the consequences from the natural disasters up to certain possible extent (Shaluf & Ahmadun, 2006a). Further, proper DM will afford a timely, effective, culturally sensitive, and gender-appropriate response (Geale, 2012). In order to have such proper DM, the factors influencing DM should be clearly identified.

Disaster knowledge factors are defined as facts that improve the knowledge of managing disasters successfully (Moe et al., 2007). Therefore, they will directly or indirectly have an effect on the method and outcomes of DM. Moe et al. (2007), categorized these knowledge factors as technological, social, environmental, legal, economical, managerial, institutional and political DM process integrates the technological factors in it's all stages itself. Each of these factors have their own challenges in DM. How those factors pretend as the challenges in DM are discussed below.

3.4 TRADITIONAL DISASTER MANAGEMENT

The traditional strategy to DM has been to treat it as variety of phased sequences of action or a continuum (Al Kilani & Kobziev, 2016). The traditional approach consists the series of humanitarian activities starting from rescue teams, materials and medical services very quickly once the disasters have created damages to the particular place (Alazawi et al., 2014). According to Alazawi et al. (2014), in a traditional DM, selection of a network path carried randomly while this random selection will be the least hectic routes and adopted by most of the decision makers as their familiar path.

3.5 CHALLENGES OF TRADITIONAL DISASTER MANAGEMENT

Pathirage et al. (2012) stated that traditional DM has to be improved a lot in order to cater its challenges as it is lacking with most of its effectivity to deal future disasters successfully. As the disasters cannot be predicted earlier, it is impossible to neutralize their negative impacts, though the consequences from those impacts can be prevented with proper strategies (Moe et al., 2007). These strategies consist of understanding on DM strategies, collectively with sensible practices and sophisticated lenitive measures and readiness designing (Moe et al., 2007).

Traditional DM systems are ineffective with the dissemination of disaster information as the random selection of a network route is consuming ample time when processing and makes the emergency strategies more difficult to be implemented (Alazawi et al., 2014). Here, network rout refers the method through which the information is disseminated. Oloruntoba (2005) stated that, technology is one of the major concern which affects the effectiveness of DM where, traditional DM is lacking in particular and traditional DM system should incorporate with cost effective and proactive technologies which will enhance the performance of the DM.

Pathirage et al. (2012) stated that, technological integration on the DM should be enhanced in terms of its decision making to implement an effective DM system. further, Pathirage et al. (2012) mentioned

that, the relevant knowledge and skills on the DM should be empowered with much excellence and also align with its needs as well. In order to validate the above statement, Wilkinson (as cited in Pathirage et al. (2012)) opined that laws related to the DM shoud express the humanitarian aspects anf if not so, it will become unsuccessful and ineffective. Further, Pathirage et al. (2012) highlighted the lack of detection and warning systems, need for powerful schooling, requirement for frequent updating of disasters associated laws, loss of price range for financial making plans measures and bad conversation as the key challenges in traditional DM.

Hartama et al. (2017) stated that, DM should deal with technological resources for the effective result. Further, lack of information inside the occasion of a disaster can cause to slow access, useless and negligent post-catastrophe recuperation (Ang & Seng, 2016). Following section discusses about evaluation in traditional DM with respect to overcoming the challenges.

3.6 MODERN APPROACH FOR DISASTER MANAGEMENT
Information technology helps the maintenance of natural resources and improved first-class of life (Walravens, 2015). Hartama et al. (2017) endorse service discovery and reservation engineering for cell ad-hoc community designed to assist disaster restoration and army environmental operations. Sensor structures can generate huge catastrophe records, human beings, environments, and so on from smartphone gadgets that have exceptional capacity to convert city communities (Ang & Seng, 2016). The system is constructed to forecast public mobility or evacuation in affected towns and may inform future DM techniques (Granell & Ostermann, 2016). However, this system will be ineffective when there is a miscalculation from the satellites used in Global Positioning System (GPS) transmitter (Hartama et al., 2017).

According to the literature, though modern techniques are evolved, they are not providing solutions for all the issues of traditional DM. To refer, Geographical Information System (GIS) applications, which are used to assist the use of information collected from GPS, still place a secondary specialise in knowledge preparation and exploration of unfortunate impacts (Granell & Ostermann, 2016). Because, the performance of the systems become unreliable due to the inaccuracy of GPS transmitter (Hartama et al., 2017). Further, DM uses a multi-institutional method as coordinated multidisciplinary response will verify that the required assistance arrives at the proper location at the right time (Geale, 2012). This improvement is highly expected in the warning stage of the DM. Because, effective and efficient warning stage minimize harm, damage and build resilience (Cinnamon, Jones, & Adger, 2016).

4.0 Social Media

4.1 INTRODUCTION TO SOCIAL MEDIA
The use of social media in disasters around the world has been well documented and established all over the world (Palen, Vieweg, Liu, & Hughes (2009); Queensland Police Service (2011)). Social media are continuously developing communication tools and connections in all regions of existence (Taylor, Wells, Howell, & Raphael, 2012). Social media technologies are with the aid of their very nature decentralized, distributed, and networked in form, with millions of customers at a couple of points of records manufacturing and consumption (Chatfield, Scholl, & Brajawidagda, 2013). They are acting as a conduit in terms of positioning human beings to legit sources of records and magnifying these messages to a broader target audience media (Taylor et al., 2012).

The growing use of 'smart phones' has been recognized as an essential factor enabling access to social media (Taylor et al., 2012). Because, social media refers to an internet-based platform that permits users to engage with every other via introduction of content such as textual content and video (Mergel & Bretschneider, 2013). As Dufty (2012) stated, social media depend on peer-to-peer networks which are corporative, decentralised and network pushed. Involvement of social media may be seen as the interplay of components of the both technical and social systems (Oliveira & Welch, 2013).

4.2 IMPORTANCE OF SOCIAL MEDIA FOR DISASTER MANAGEMENT

Social media promotes information sharing and dissemination which can support the psychological well-being of disaster victims (Taylor et al., 2012). A few case studies show that social media played positive roles in information sharing and dissemination in disaster responses (Dufty, 2012). Further, Samarajiva and Waidyanatha (2009) validated the importance of social media by recognizing it as the primary means of public warning. Social media tools not only useful for sharing disaster information but also emotionally supporting affected communities and victims under disasters situations (Dufty, 2012). One important aspect of social media is that it does not always require huge capital investments by the organization (Oliveira & Welch, 2013). During the 2011 series of natural disasters in Australia, New Zealand and Japan, the importance of social media emerged sharply as a powerful communication channel for emergency management and response media (Taylor et al., 2012). Examples of social media include blogs, discussion forums, chat rooms, wikis, YouTube, Channels, LinkedIn, Facebook, and Twitter (Dufty, 2012).

According to Taylor et al. (2012), there are two aspects of social media of particular relevance to their use in the context of natural disasters. Namely, their ability to provide access to timely public safety related information from official and informal sources and other one is their ability to enable connectedness. Where, both of these characteristics are expressing about the existence of real-time communication in social media. As the concept of Early Warning (EW) is also related to such real-time communication, the above discussed features of Social media hiddenly interpret its suitability for the EW process. Social media allows users to report information about emergency situations to emergency management organizations and users in real time (Kim et al., 2016). The strengths of social media were highlighted during the Japanese Earthquake response (Kim et al., 2016).

4.3 CHALLENGES IN USING SOCIAL MEDIA

Historically, the public has trusted traditional media outlets like television news, local newspapers, and local radio to get critical information regarding local emergencies (Kim et al., 2016). Although social media is being popular in all over the world, there is still a strong interest for emergency information via traditional forms of media, especially television media (Taylor et al., 2012). Because, there are several limitations in social media communications.

Kim et al. (2016) identified, trustworthiness of information delivered via social media as one of the administrative challenges in DM. Allowing users to easily edit and manipulate the content of information, requirement on checking the violation of policies, and need of monitoring to avid inaccurate information transmission are the challenges identified in MD. Dufty (2012) and Lindsay (2011) also stated that, there are potential issues of trust and misinformation that will need to be managed by emergency agencies when using the more 'open' social media. Hence, this raises the question, is it worthwhile to use social media technology to improve the resilience. According to Kim et al. (2016) public and emergency management literature pays attention to the potential or actual roles of social media. While there are various types of social media, this study focuses on Facebook and Twitter which are identified as popular social networking and blogging systems by Kim et al. (2016). However, there are several researches carried out to interpret the use of social media. Following section will identify such researches and their key outcomes to validate that social media is effectively usable for DM.

4.4 EXISTING USE OF SOCIAL MEDIA

The use of social media is an evolving phenomenon and it has become widespread and can serve a variety of purposes (Lindsay, 2011). This section will discuss the existing use of the social media all over the world for the DM and EW by elaborating the key outcomes of researches.

Queensland Police Service (2011) described the social media as the vehicle to reach the public and the media in the shortest time frame. The Queensland Police are world leaders now in the use of social media in disasters. Lindsay (2011) considered the use of social media for emergencies and disasters on

an organizational level may be conceived of as two broad categories. First, social media can be used somewhat passively to disseminate information and receive user feedback via incoming messages, wall posts, and polls. Second approach involves the systematic use of social media as an emergency management tool. Systematic usage might include, using the medium to conduct emergency communications and issue warnings, using social media to receive victim requests for assistance, monitoring user activities and postings to establish situational awareness, and using uploaded images to create damage estimates, among others.

McEntire (2014) found that flood-related tweets that contain more useful information for situation awareness are significantly closer to flood-affected regions than others. Chatfield et al. (2013) stated that, while the type of social media use studied varies widely from Facebook, Twitter, blog, web forum, photo sharing, microblog and SharePoint, it appears that Twitter is the most frequently used social media channel in disaster situations. According to Chatfield and Brajawidagda (2012), twitter-based warning system demonstrated its value as a viable complement to Indonesia's comprehensive disaster information management system for governments, by informing the public and creating public value through its communication speed, reach and information quality.Kim et al. (2016), analyzed the provision of disaster information on social media such have a positive effect on the perceived level of organizational resilience. Further, Kim et al. (2016) found that, if community members are widely connected via a social media network, the effects of information sharing and emotional support through social media use will be heightened. If most residents do not follow the information on the social media website currently, emergency response organizations need to educate and encourage residents to be connected to the social media websites.

5.0 Sri Lankan Context

It was pointed out that the occurrence of disasters from almost all kinds of hazards is among the highest in Asia and the Pacific (Shaluf & Ahmadun, 2006a). Further, Dutta and Basnayake (2018) in the recent research, validated the importance enhancing the EWS in Southeast Asia. The 2004 Indian Ocean tsunami that claimed the lives of 35000 of Sri Lankan people and displaced one in twenty has highlighted the critical importance of an effective National Early Warning System for Sri Lanka (DMC, n.d.). Because, Warning is a crucial component of the overall risk management system that failed in the 2004 Indian Ocean tsunami (DMC, n.d.).

Further, Kurita et al. (2006) stated that, this created an umbrella organization called the National Council for Disaster Management and provides a framework for disaster preparation and response in Sri Lanka. Sahana is a free and open source software application adopted in Sri Lanka, for relief operations, recovery and rehabilitation (Careem et al., 2007). However, according to Careem et al. (2007), Sri Lanka is not potentilly capable in terms of incorporation of information and communication technology for DM solutions. DMC is the main focal point responsible for coordinating EW in Sri Lanka which operates its performance through the Emergency Operation Centre (Samarajiva & Waidyanatha, 2009). In the present, EW dissemination is performed through Nation-wide Emergency Communication System used in Sri Lanka (DMC, n.d.).

Dutta and Basnayake (2018) stated that, the sequence of events has shown that although DMSs are in place in the region but the effectiveness of these systems in terms of timely and meaningful dissemination of warning information have been found to be considerably weak resulting in considerable gap between warning dissemination and response. Further, the literature found with respect to DM is validated by an interview with experts in DM. Through this interview, it was identified that, there is a requirement for a usable social media application for the DM. Hence, it is evident that, there is a requirement and expectation by the relevant organisations for the adoption of social media in DM.
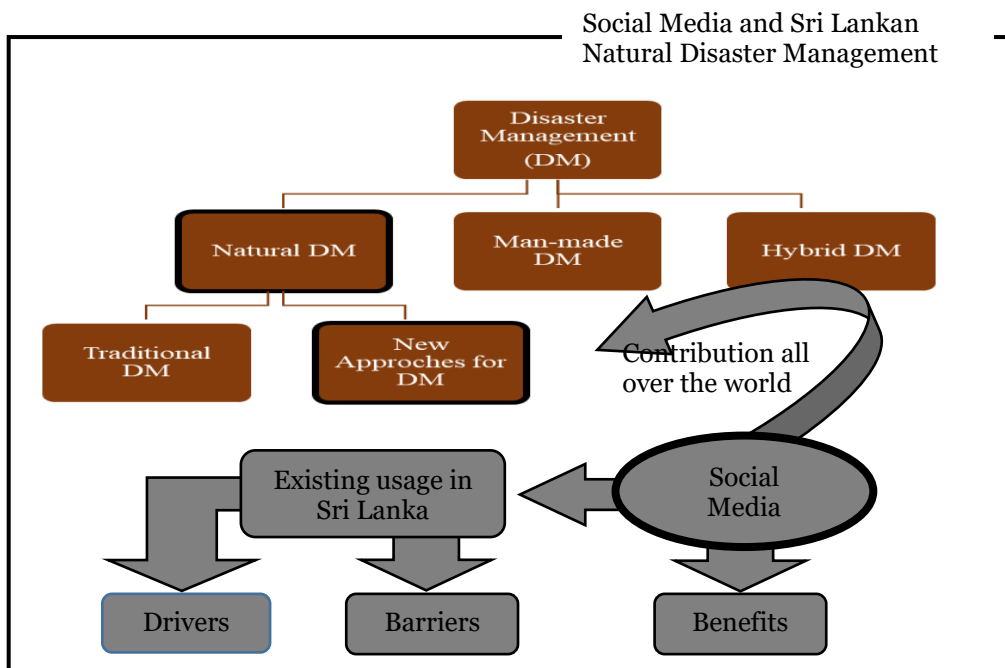
6.0 Conceptual Framework

Figure 1 : Conceptual Framework

Figure 3 interprets the conceptual framework that is presented for the study under consideration. It is prepared based on the knowledge prepared through the literature review. As interpreted in the Figure 1, this proposed research's key areas are natural DM and the social media. Hence, by discussing about the DM, the importance of consideration on natural DM is discussed. Further, followingly, the traditional method of natural DM and modern approach are discussed. Later, the concept of social media and its contribution to the natural DM supported with literature findings.

7.0 Conclusion

Disasters are severe distractions of the society, and it causes many adverse effects. These adverse effects by disasters over the past decades are extensively corroborated by many researches. Thus, a proper DM is required to safeguard from such disasters. There are several challenges in traditional and even the existing modern DMS. Social media has been identified as one of the major solutions for the enhancement of DMS. All over the world, use of social media for DM enhancement is well established. Though social media is used in SL, it is not effectively utilised for DM yet. Social media will contribute to DM by enhancing the flow of disaster notification in efficient and effective manner within a short period of time to huge number of audiences.

As a way forward, to focus on the Sri Lankan context, the existing usage of social media and barriers and benefits related to adoption of social media for natural DM in Sri Lanka will be analysed through the data collection and analysis. Finally, to achieve the aim of the study under consideration, framework will be proposed to by addressing the analysis results to enhance the natural DM in Sri Lanka through the use of social media. Ultimately to achieve the aim of this study under consideration, a framework will be proposed by addressing the analysis results to enhance the natural DM in Sri Lanka through the use of social media.

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