Exploring Social Media Affordances in Natural Disaster: Case Study of 2015 Myanmar Flood

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Abstract

This study examines the emerging use of social media in complex social phenomenon, natural disasters. By adopting an affordance perspective, we focus on how local communities harness the power of social media in disaster response. Using an interpretive approach, we identify different affordances of social media and examine how these affordances enable local communities to respond to disaster situations and achieve social outcomes in the case of 2015 Myanmar flood. The lack of theoretical development in research on societal consequences of emerging technologies (e.g. social media) makes this study timely, relevant, and worthwhile. Our findings demonstrate that social media transformed the way citizens, organizations, emergency responders, and government think and act creatively, improvising new means of addressing the challenges posted by a disaster. This study generates theoretical and practical implications for understanding the role of social media in addressing societal challenges in developing countries.

Keywords Social Media, Disaster Response, Affordances, Societal Challenges, Case Study Research

1   Introduction

Information and communication technologies (ICTs) have opened up unprecedented opportunities to address a wide range of societal challenges such as unemployment, poverty, illiteracy, crime, underdevelopment, inequality, and climate change etc. (Majchrzak et al. 2012). Among all the complex challenges facing our societies today, natural disasters pose one of the most critical challenges that bring about devastating impacts on our society. Over the past decades, the world has been stricken by severe natural disasters, such as earthquakes, floods, tsunami, and storms. Natural disasters are unpreventable events that involve severe physical harms and social disruption in societies (Fritz 1961). According to the United Nations report, the incidence of natural disasters worldwide has steadily increased over the years. Specifically, countries in Asia and the Pacific are more prone to disasters than those in other parts of the world (UNESCAP 2010). For the period of 2005-2014, 40% of the world's disaster events occurred in the Asia Pacific region, which caused 45% of the world's economic loss and 60% of total global deaths related to disasters (Asia-Pacific Disaster Report 2015). With the common occurrence of natural disasters, developing countries are more vulnerable than industrialized countries because of lack of infrastructure, poor preparedness and mitigation measures for disasters and inadequate emergency response during disaster. Since natural disasters are inevitable, how to minimize the negative impact of disasters is an important social issue, particularly for developing countries. For example, a major factor in the impact of the 2008 Myanmar cyclone Nargis, killing over 140,000 people in the Irrawaddy delta, was the government's inability to communicate early warning messages to affected communities (ABCID 2014). Due to the prevalence of disasters worldwide, ICTs have become valuable tools for governments and organizations in enabling information and organizing resources for disaster management in order to mitigate overwhelming impacts of disasters.

In recent years, social media has emerged as a popular medium for providing new sources of information and rapid communications, particularly during natural disasters (Yin et al. 2012). While traditional media primarily facilitates one-way information dissemination, social media (e.g. Facebook, Twitter, YouTube) creates opportunities for two-way interaction among individuals, organizations, and the public (Bortree and Seltzer 2009). Thus, social media has become an important alternative information channel to traditional media during crisis. Social media are 'a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow for the creation and exchange of user-generated content' (Kaplan and Haenlein 2010) (p. 61). Due to its communicative abilities and efficiency in facilitating coordination, the use of social media during disasters has become a new global phenomenon. For example, during the 2010 Haiti earthquake, the public used Twitter to communicate with international communities to source creative solutions and immediate aid, saving many lives (Fraustino et al. 2012). In the 2011 Japan tsunami, citizens used Twitter and Facebook to send warnings, request help, share disaster scenes, and connect to families and friends (Skarda 2011). During the 2012 floods in Queensland and Victoria, Australia, Facebook became a primary tool to disseminate real-time information to the public (Bird et al. 2012).

Although social media have been proved to be a unique information source during disasters over the past few years, it remains unclear how exactly social media influence and affect people's way of doing activities and actions, and their relationships. *First,* most IS studies in crisis response emphasize on *social* perspectives, therefore ignoring the features and functionalities of IT. This is due to the limitations of the theories that make simplistic and deterministic assumptions about the effects of IT on human behaviours and organizational outcomes (Majchrzak and Markus 2012). *Second*, existing literature focus on the use of an IT system and application as *a whole*, without investigating the use and effects of *specific features* of an IT system (Balci et al. 2014). Markus and Silver (2008) stated that it is essential for understanding what it is about ICT that may contribute to the behavioural and social outcomes of ICT use. Given that societal challenges (such as disasters) are shaped by dynamic and interdependent factors, involving different stakeholders, Majchrzak et al. (2012) have urged scholars to develop better theories about the precise nature of the role of ICT in complex social phenomenon by focusing not only on the features of ICT but also on the social context of the uses of ICT that are afforded (or inhibited) by those features. We argue that, in order to achieve social outcomes of ICT use in the context of disaster response, a community must be perceived (and realized) the potential and possibilities *afforded* by ICT. In this sense, 'affordance' is a powerful concept in analyses of socio-technical phenomena (Cabiddu et al. 2014) and is new to research within the developing country context. The theoretical concept of affordance enables the simultaneous understanding of technology and individual/organizational characteristics. Affordance facilitates different user's perceptions of available opportunities to use technology (Leonardi 2011). Review of the literature indicates that there is currently a lack of research on social media use in disaster response from *affordance* perspective. Using the case of the 2015 Myanmar flood – one of the most devastating flood disasters in recent decades, our study seeks to address this gap by exploring the affordances that social media can provide

communities to effectively manage disaster response. The aim of this study is to provide a concrete understanding of the potential and consequences of ICTs in developing countries, specifically to examine how social media was enacted by the communities in responding to disaster situations and achieving relevant social outcomes. With this phenomenon of interest, we pursue the following research questions: How does social media enable disaster response? What affordances emerged from social media use during disaster and how do the social media affordances influence people interactions in disaster response?

2 Literature Review

2.1 Disaster Response and Social Media

Disaster management can be generally modelled into four phases namely mitigation, preparedness, response, and recovery. Having a good strategy for each of the phases is essential for an efficient disaster management, however the effective use of IT tools is critical during response phase to engage community networks in order to gather, analyse, and disseminate information in a timely manner (Chan 2014). There has been an increased attention of researchers in examining the role of technologies in disaster response during the past decade (Leidner et al. 2009; Majchrzak et al. 2007; Pan et al. 2012; Yang and Hsieh 2013; Yates and Paquette 2011). With the rapid proliferation of social network applications such as Facebook, Flickr, Instagram etc., social media has become an important technology for disaster response due to its instant connectivity and open platforms (Simon et al. 2015).

Much of the literature has explored the use of social media in disaster response in various conceptualizations such as how social media facilitates collective intelligence (Vieweg et al. 2008); the phenomenon of digital volunteerism (Starbird and Palen 2011), and self-organization in the community (Nan and Lu 2014); and how social media can be enacted as boundary objects-in-use (Tim et al. 2017b). However, most previous studies have focused on *social perspectives* such as social structure and interactions among users, and outcome behaviour. For example, Hughes et al. (2008) described how social media enabled social convergence behaviour during disaster events. Bruns et al. (2012) examined the developing networks on Twitter platform in the Australia floods, focusing on the behaviour of the community. Ling et al. (2015) examined how social media (Facebook, Twitter, YouTube) played the role as a mediating structure in empowering communities in the 2011 Thai flood. Another stream of research has emphasized on *technological perspectives* such as adoption of social media platform or utilization of the features and contents of social media. For example, Liu et al. (2008) found features of Flickr (e.g. group purpose, tags, images, cross referencing) as the norms of citizen photography in various disasters. Ehnis and Bunker (2012) examined the use of social media platforms, Facebook and Twitter, by Queensland Police Services (QPS) during the 2010-2011 Queensland flood events and highlighted that Twiiter was used as a range amplifier and Facebook was used as a more detailed information platform. Lachlan et al. (2014) analysed the content of Twitter messages during Snowstorm Nemo and found that actionable information appeared to be more common in localized hash tags than in non-localized hash tags. In fact, theorists have called for a break with traditional IS literature characterized by either technological determinism or social determinism (Markus and Silver 2008; Treem and Leonardi 2012). Existing research on social media use for disaster response is notably silent on examination of the features of the technology in relation to the social action of users. This knowledge is important for both government and the public that need an understanding of how social media is being perceived and used by the communities and how these could possibly facilitate disaster response efforts, thus to better prepare for future crises. The concept of affordance provides us with a theoretical lens to look beyond technology features and analyse how and why different users and user groups appropriate and interpret features through social interactions, in light of their goals and values (Markus and Silver 2008), and thus achieve relevant social outcomes. There are three types of social support which are critical during disaster events, i.e. informational support, emotional support, and material support (Orford 1992). *Informational support* updates communities on the latest crisis information, and guides them in unfamiliar situations (Endsley 1988); *emotional support* includes the provision of care, empathy, and well-wishes (Houston et al. 2015); and *material support* helps channel the emergency supplies to the victims (Orford 1992). During stressful events like disasters, it is critical to effectively deliver the right support for the dynamic needs of the users.

2.2 Technology Affordances

A technology affordance refers to an opportunity of action (Hutchby 2001) – that is, "what an individual or organization with a particular purpose can do with a technology" (Majchrzak and Markus 2012)(p.1). Technology affordance is understood as a *relational* concept such that potential interactions between people and technology, rather than properties of either people or IT artefact alone. A technology affordance perspective frames the action potentials of technologies (Leonardi 2013; Markus and Silver

2008) and offers concrete understanding of the uses of the IT artefacts and the related implications for individual behaviours (Majchrzak and Markus 2012; Majchrzak et al. 2016) and organizational changes (Volkoff and Strong 2013; Zammuto et al. 2007).

Prior studies have mainly focused on identifying and defining functional affordances (i.e. action potentials) of a particular IT artifact such as social media affordances enabled community building (Treem and Leonardi 2012), and knowledge sharing (Majchrzak et al. 2013); and affordances of IS in green transformations (Seidel et al. 2013). Recent research has moved beyond this and investigated how functional affordances are perceived, interpreted, and actualized by users such as developing affordance-actualization in the implementation of electronic health record (EHR) systems (Strong et al. 2014); actualization of IT affordance in Alibaba.com (Tan et al. 2016); and digitally enabled affordances for environmental movement in rural Malaysia (Tim et al. 2017a). While previous studies discussed affordances in the context of enterprise organizations, only recently scholars have emphasized the affordance concept in examining the role of ICTs in addressing complex social problems (Majchrsak et al. 2016). For example, the capabilities of ICTs in creating new identities of migrants without losing touch with distant relations (Andrade et al. 2016); and the new business opportunities individuals gain from online services within a depressed region (Jha et al. 2016; Leong et al. 2016).

The technology affordance perspective serves as an appropriate lens for the present study, as it allows researchers to understand the precise nature of a technology (Majchrzak and Markus 2012). It is therefore particularly suited for examining the role of an emerging technology (e.g. social media) because it provides how social media becomes perceived and used in similar and different ways across various social environments (Vaast and Kaganer 2013). Central to *relational* understanding is that different users can have different goals when using the same IT artifact. Affordances permit researchers to theoretically frame *"that one technology can support multiple affordances, and, consequently, that each member of the same social group can enact a different affordance or set of affordances when using the same technology"* (Leonardi, 2013, p. 751). Affordances can be distinguished between individualized, collective, and shared affordances as shown in table 1.

Types	Description
Individualized Affordance	An affordance that enables the user to do something with a specific feature of technology that others cannot do and will benefit from it.
Shared Affordance	An affordance that is shared by all members of a group and represents similar use of the technology's features by all members, for a common goal
Collective Affordance (Leonardi 2013)	An affordance that is collectively created by members of a group and that allows the group to do something collectively that it could not otherwise accomplish. This can be the result of pooled individual affordances in the form of differential feature use, to achieve the group level goal

Table 1. Types of Affordances

The present study adopts this conceptualization considering that in addition to uncovering affordances, researchers should pay attention to the nature of the relationship between affordances in order to examine the different structural levels from which they emerge in their constituent parts (Volkoff and Strong 2013). To our knowledge, there has not been relatively little research on the material properties of social media that grant different users with different possibilities of action, and how these properties contribute to different outcomes. Majchrzak et al. (2016) emphasized that by looking at technologies as sets of affordances (and constraints) for particular actors, IS researchers can explain how and why the 'same' technology is used and has different outcomes in different contexts, thus enriching IS theories. This study sets to contribute to this knowledge gap by adopting the concept of affordances to examine the unique features of social media, the possibilities for action, and the relevant outcomes it affords in specific societal challenge, a natural disaster.

3 Research Methodology

This study adopts the qualitative case research methodology. As the use of social media in disaster response is a complex, multi-faceted and an emerging phenomenon, a case study methodology is appropriate for such exploratory research (Siggelkow 2007). The case study research provides a comprehensive understanding of the current phenomenon of social media-enabled disaster response, as it gives real-life contexts, experiences, and perspectives of social media use in society during disaster. We conducted an in-depth case study following established guidelines (Klein and Myers 1999) to answer "how" research question (Pan and Tan 2011; Walsham 1995). Adopting an interpretive approach (Walsham 1995), we examined the 2015 Myanmar flood to understand how social media enable communities in responding to the disaster. An interpretive approach emphasizes the social construction of reality and offers an opportunity for deep insights and rich theoretical statements to be developed

from empirical data (Walsham 1995; Klein and Myers 1999). The technology affordance perspective served as a "sensitizing device" (Klein and Myers, 1999, p. 75) to make sense of different user's perception of social media use in disaster, throughout the data collection and analysis process.

3.1   Research Context

Myanmar is one of the poorest countries in Southeast Asia with an official population of 53 million. With the democratic reform in 2011 after military dictatorship, the country is at the edge of political, economic and social transformation. Due to the rollout of ICT after the liberalization of telecom industry, mobile phone penetration has increased from 7% to 60% between 2012 and 2015, making it the fourth-fastest growing mobile market in the world[1]. With the growing availability of smartphones and increasing access to Internet, Facebook has become a popular social media tool in Myanmar because it is the only platform that generates a lot of local contents (FrontierMyanmar 2015). Reportedly, Myanmar had 7 million Facebook users as of November 2015 and increased to 11 million in June 2016[2]. Since Government has embraced the importance of providing citizens with open access to technology, Myanmar has a strong personality and its own potential in a society where change is all around (SWIA 2015). The 2015 Myanmar flood was one of the most catastrophic disasters in recent decades. More importantly, the disaster represents the first paradigm shift that social media played an important role as a communication medium during a crisis in Myanmar. This flood disaster provides a unique situation to examine how Myanmar populations participated in its growing information society and the societal impacts associated with greater ICT use in time of crisis.

3.2   Data Collection and Analysis

In late July 2015, the Cyclone Komen caused Myanmar some of the worst flooding disasters in history. Data collection was started after the flood occurred in August 2015. Archival data were initially collected from social media, particularly Facebook, in the first phase of data collection. A few popular Facebook accounts were observed to screening user-generated contents of most influential posts and pictures, based on the number of followers, likes, and shares. Additional secondary data were collected from local newspapers, journals, government websites, international NGOs reports (e.g. UNOCHA), and other online media such as CNN, BBC, Channel News Asia news reports to gain initial understanding of the flooding event. The second phase started in October 2015. Using snowball sampling method (Biernacki and Waldorf 1981), key players were identified through primary contacts such as community leader, professionals, and government officials who experienced critical events in flood response using social media. After gaining access, a field visit started in November 2015 that comprised of semi-structured interviews and a focus group. A total of 28 interviews were conducted in approximately 3 weeks during the field trip. The interviews and focus group discussions were all open-ended and exploratory in nature and conducted in both Myanmar and English. Each interview typically lasted between 45 and 90 minutes. Interviews were digitally recorded (with permission) and later transcribed for data analysis. Data were analysed concurrently with data collection, exploiting the flexibility of the case research methodology (Eisenhardt 1989). We went through multiple readings of interview transcripts, archival documents and updates on Facebook, and referred to the literature as themes emerged. We then coded using a blend of open, axial, and selective coding (Strauss and Corbin 1998) in mapping our data to a set of themes. To manage the voluminous amount of empirical data, we created a narrative describing the events and activities that occurred in flood disaster. In addition, features and functionalities of social media, as well as perceived values and effects of social media uses were documented in a visual map (Langley 1999).

4   Case Description

In July 2015, Myanmar suffered the worst flooding disaster in recent decades. Torrential rains started from 16 July caused floods and landslides in several parts of Myanmar. The Cyclone Komen exacerbated the situation by bringing strong winds and heavy rains in Western and Northern Myanmar, which resulted in severe and widespread inundation across 12 of the country's 14 states and regions. The disaster persisted until September 2015 and displaced almost 1.7 million people and a total of 132 people died. Half a million houses and 1.15 million acres of farmland were swamped including large parts of Myanmar's 'rice bowl', the Irrawaddy Delta. Affected areas have suffered MMK 231.3 billion (US$ 192.8 million) in direct economic losses (NNDMC 2015). Despite the emergency situation, government failed to release timely information on the extent of disaster. The declaration of a state of emergency was made

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[1] Ericsson Mobility Report 2015: https://www.ericsson.com/assets/local/news/2016/03/ericsson-mobility-report-nov-2015.pdf

[2] Asia Internet Stats: http://www.internetworldstats.com/stats3.htm

on July 31, only after 2 weeks of rainfalls and flooding (CSO August 2015). Given the lack of early warning system and preventive measures, government admitted its 'weak' response to massive floods on 4 August 2015 (Mirror August 2015). Government agencies used to convey uniform messages through traditional media – printed newspapers and broadcasting on television and radio stations. Myanmar government also relied on existing official websites to publish information, which are often under-managed. In fact, government's preparedness, response, and management of this massive flood were apparently inadequate when facing the emerging disaster. As the situation continued to evolve, people were demanding up-to-date, consistent, and localized information. Having a bad experience from the 2008 Nargis disaster where the military government in power at the time failed to deliver early warning messages, killing over 1.4 million residents, Myanmar people had little trust and confidence in current quasi-civilian government's ability to handle the crisis and turned their attentions to social media. Due to recent improvements in Myanmar's telecom infrastructure and increasing access to smartphones, many residents were able to monitor the flood situation and share information (e.g. flood scenes, donation sources, etc.) on Facebook (New York Times 2015). Several Facebook pages had appeared instantly and existing individual and group pages had eventually grown up. For example, one of the earliest donation pages "Save Myanmar Flood Disaster" was created on 1 August 2015 and in a few days it had more than 10,000 'likes' (MyanmarTimes August 2015). Despite widespread disaster, Myanmar society had shown the resilience and determination in this time of crisis. In light of flood response, individuals, organizations, as well as military and government officials took their roles based on needs. This flood disaster demonstrated how the social movement momentum was taking off in Myanmar, harnessing the power of social media.

5 Case Analysis and Findings

The analysis of our data highlighted multiple concepts related to social media affordances that guide, influence (or constrain) human action and determine the way in which people and technology relate each other during the disaster. Adopting the technology affordance concept, we emphasized the potential interactions between the technology with particular features and the users with particular purposes and characteristics. In this study, we focused on the technology as social network sites of Facebook, given that the most dominant social media tool in Myanmar at the time of 2015 flood. We referred to user characteristics as 'user role' in relation to the expertise or professional role such that the user of an IT artefact has an individual capacity for activity (Bernhard et al. 2013), and 'user goal', i.e. a potential user has a particular goal in a given task situation (Markus and Silver 2008). From analysis of data, we identified **four affordances** of social media as they emerged in relation to the underlying material properties of Facebook and user characteristics in the context of disaster response. Users initially perceived potential action permitted by specific feature of Facebook and, **when actualized**, lead to affordances in *crisis awareness, relief coordination, volunteer mobilization* and *crowdsourcing*, as the key manifestation of disaster response activities, thereby achieving relevant social outcomes.

5.1 Affordance in Crisis Awareness

During natural disasters, access to information is essential. Social media provides access to relevant and vital information from both official and non-official sources (Taylor et al. 2012). This relates to certain features of Facebook that we identified as **information access** [e.g. profile, wall post (status, photo, video, hyperlink)] and **interaction** (e.g. add friend, follow, like, comment) features. These material properties of Facebook were interpreted by individuals as affording *action possibilities* for information creation and dissemination (e.g. emergency situation, correction of misinformation). Our analysis finds that Facebook affords **crisis-awareness**, i.e., it enables individuals to engage in an open public space for creation and consumption of crisis-related information under their own responsibility (Seidel et al. 2013). We observed how this affordance grants every individual the ability to contribute and obtain flood information *independently*, using a specific feature of social media (e.g. status, photo), and thus enabling **an individualized affordance.**

The following comments captured the user's perceptions and actions permitted through Facebook. In the onset of disaster, the flood first hit the impoverished northern Sagaing Region. In the worst hit area of Kalay, the students and teachers were blocked in at the Computer College hostel surrounded by floodwaters for days (TheIrrawaddy 2015). A local student explained how social media helped spread emergency information and receive assistance. *"One of the trapped students posted a status on Facebook that there was a pregnant teacher in due delivery at the flooded campus. It was spread very fast and reached to the president. Soon a military helicopter successfully rescued and sent the teacher to the hospital and delivered aids to the students"* (T.T. Ray, volunteer). Immediate access and distribution of information allowed people to connect with needed resources speedily and emergency authorities to more easily locate flood victims than in the past.

During the peak of the disaster, rumours and inaccurate information were disseminated, especially about the condition of the dams overflowing and being burst. Facebook was used to correct misinformation by authorities. A local authority from the Irrigation Department (Magwe) responded to the public by staying up all night at the dam and constantly uploading the status and photos of *real-time* conditions on Facebook. *"I would remain here until the dam burst"* (S.M. Lwin, engineer). Understanding the functionality of Facebook for information dissemination and with his dedicated role and goal to counter the rumour, he took an action that eventually dispelled the rumours and relieved the fear of residents. He gained public trust and became a social media hero with more than 20,000 followers soon after the post and honoured by the president for his effort in response to the public concern (New Mandala 2015). These statements exposed that Facebook afforded publishing and distribution of emergency information that created awareness of crisis *at a speed and scale that is otherwise impossible*, which in turn led to relevant social outcomes, in terms of informational support (situation update, water level), mental support (emotional messages), and material support (rescue transport, monetary fund, relief supplies).

5.2 Affordance in Relief Coordination

Social media allows people to establish connections and link with other individuals who are similar to them as users sharing posts and having discussion in real times (Simon et al. 2015). This relates to certain features of Facebook that we identified as **content sharing** [e.g. share (post, note, photo, video, hyperlink), tag, hash tag, instant message] features. Individuals perceived and interpreted these material properties of Facebook as affording *action possibilities* for sharing data, information, and knowledge, recognizing like-minded people and building network. Our case demonstrates that Facebook affords **relief coordination**, i.e., it enables connection between people and facilitates coordination, *influenced by shared interest* (i.e. humanitarian assistance). We observed how such affordance of Facebook allows individuals to join together for a common goal (e.g. fundraising), using similar features of social media (e.g. share, tag), and thus creating **a shared affordance**.

Until August, the floods were recurrent and moving southwards. Volunteers teamed up on Facebook in organizing relief efforts. For example, two volunteers explained about their partnership through Facebook. *"Only by social media, we came together! I saw many people sharing Dr. Myint's posts of emergency practices from Nargis (e.g. how to make a raft with a tube and a rope, how to purity rain water) on Facebook. I connected with him to organize fund-raising and distribution of relief supplies to the Irrawaddy region. We collected donations about 115 million MMK within a week and recruited volunteers for packaging and delivery through our social network"* (Ko Navana, politician). *"Sharing documents and photos of relief operation (e.g. donation list, number of packages, and distributed areas) makes transactions open and transparent which attracts more people to contribute"* (Dr. M.M. Myint, freelance disaster management specialist). These excerpts described that Facebook afforded connection of similar people that facilitated relief coordination as volunteers united in flood response and achieved relevant social outcomes, in terms of informational support (emergency practices), and material support (monetary fund, relief supplies).

5.3 Affordance in Volunteer Mobilization

Social media can be utilized to mobilize and organize populations to achieve various objectives and inform them with the most up-to-date information, which might not be available through alternative channels (Taylor et al., 2012). This relates to certain features of Facebook that we identified as **communication** (e.g. group chat, voice/video call, and check-in) features. Individuals perceived and interpreted these material properties of Facebook as affording *action possibilities* for facilitating communal activities within the group in relief operation. Our data shows that Facebook affords **volunteer mobilization**, i.e., it enables deployment of people and resources by facilitating communication and dynamic interaction among group members. We observed how such affordance of Facebook allows group to organize and communicate with members for immediate updates with a common goal (e.g. aids distribution), using similar features of social media (e.g. Facebook messenger), and thus creating **a shared affordance**.

A volunteer explained the use of Facebook as an efficient communication tool in distribution of relief aids to the affected areas. *"For mission on the ground, we used 'group chat' as it allowed us not only to communicate within the group anytime anywhere but also to attach documents and directly send the photos and videos of relief mission (e.g. flood scenes, donation of relief items to the victims) back to the head office which were posted on our main KBZ page"* (T.H. Kyaw, KBZ Bank). This example showed that Facebook afforded two-way communication between members of the group that efficiently facilitated mobilization of volunteers in relief operation, which led to achieve relevant social outcomes, in terms of informational support (flood relief information) and material support (distribution of aids).

5.4 Affordance in Crowdsourcing

Social media allows capable crowds to participate in various tasks, e.g. to collect, process, and interpret time-sensitive information (Gao et al. 2011). This relates to certain features of Facebook that we identified as **collaboration** (e.g. embed-in post, tag, group), **managing** and **presentation** (e.g. privacy settings, album) features. Individuals perceived and interpreted these material properties of Facebook as affording *action possibilities* for group formation, linking resources, and displaying information. Our findings exemplify that Facebook affords **crowdsourcing**, i.e. it enables communities to self-organize and establish collaboration. We observed how different communities could flexibly crowd-source for required resources (i.e. geo-location maps) *without formal planning and restrictions.*

As the flooding persisted, there was a significant demand and need for maps and spatial information to implement an effective response. The emergency responders need to receive information as to the location of the afflicted population and how best to reach them promptly (Zook et al. 2010). A passionate environmentalist summarized a collaborative work: *"With a personal request from Ministry of Social Welfare, Relief and Resettlement (MSRR), I organized a group of GIS experts on Facebook. Requested and Supported by the Japan Aerospace Exploration Agency (JAXA), we obtained satellite images of Myanmar flooded areas and created localized maps using integration of GIS (Geographic Information System) and social media tools including email, Google Drive, Google Earth. Most often we managed to share flood images within the group through embed-in link. The resulted maps were posted to the public as a catalogue of photos in specific albums to review easily"* (M.M. THAN, professional). Since the lack of information complicated emergency response efforts in the early days of the flood, this initiative could be regarded as a new kind of crowdsourcing within different communities and that undoubtedly helped with the coordination of humanitarian services.

In the meantime, the government began to realize the need for utilizing the power of social media to instantly broadcast and amplify emergency messages to the public. The minister of Information (MOI) explained the collective action leveraged by social media: *"Through Facebook I connected with THAN to collaborate with his group of resourceful people to integrate and deliver crisis information. In cooperation with other agencies, we aggregated a diversity of reports including the graphs of water levels (rivers, dams) over the days, the list of affected populations in flooded areas, together with their GIS maps to visualize data for relief decision making"* (Y. Htut, minister). Being the minister of information and the president's spokesperson, he took the role on behalf of government agencies to accumulate and distribute localized, time-sensitive information to the public through multi-channels such as SMS alerts, ministry websites and Facebook pages as well as traditional media of radio, TV, and newspapers. Thus, people and emergency responders could determine the magnitude of the disaster and take appropriate actions. This effort demonstrated that Facebook afforded individuals from different communities to conduct non-interdependent tasks, utilizing differential features of technology (e.g. group, Google Earth) embedded in social media to achieve a group-level goal, thus arising **a collective affordance,** as a result of pooled individualized affordances, and achieving relevant social outcomes, i.e. informational support (geo-spatial information, aggregate crisis report).

To summarize, within the communities each affordance can be simultaneously actualized by many individuals depending on their goals, and every individual may enact multiple affordances. Furthermore, these different affordances are interrelated in various ways, and their actualization may contribute to achieving multiple outcomes. The 2015 Myanmar flood case offers a valuable opportunity to understand possibilities enabled by an emerging technology (i.e. social media) in addressing societal challenges. This study is significant because it contributes to our understanding of the role of social media in disasters by focusing on the country that has recently opened-up to the world from decades of isolation, previously has lacked access to the technology and information, and where Facebook has become the only channel dominating citizens to engage in the public affairs of the country. The case demonstrated how different stakeholders such as victims, volunteers, professionals, and authorities interpersonally communicate with each other through social media during a flood disaster and how that in turn affect a variety of social activities. Our findings revealed that social change was taking off by the communities in facilitating disaster-response activities *different from the past* such as information sharing, fund-raising, volunteering, and crowdsourcing, using Facebook social network. Due to the magnifying effect of social media, flood relief were fast and transparent, which contributed to gaining social benefits such as faster response time, higher rescue opportunity and life-saving, and larger donations. Overall, the case of Myanmar flood 2015 illustrated that social media transformed the way citizens, organizations, emergency responders, and government, think and act creatively – improvising new means of addressing the challenges posted by a disaster.

6   Concluding Remarks

This study contributes to the emerging literature on the use of social media in natural disasters in the developing country context. An empirical examination of the 2015 Myanmar flood from the affordance perspective complements the existing crisis management studies that primarily focus on either social or technological perspective by adopting a relational view of material properties of technology and social actions of people to identify the affordances of social media. Beyond identifying the affordances of an emerging technology, this study advances the understanding of social media-enabled disaster response by conceptualizing these affordances into different types: individualized, shared, and collective affordances. Our study is one of the first that explores how affordances are created in the communities, thus contributing to the affordances literature in IS that prior studies have been mainly conducted at the individual and organizational levels. The findings of this study can be used to explain why organizations and government agencies should utilize social media for disaster response. Understanding how the characteristics of people influence their perception and reaction to disaster response through social media will help policy makers how to use social media for identifying, engaging appropriate citizens and facilitating interactions between different social networks into their crisis management actions, thus to better prepare for future crises. By using social media technologies, governments could revolutionize infrastructure, build enabling conditions, and ultimately make policy decisions to develop and foster the use of internet-based crisis response systems. With respect to technology design, identifying specific material properties of Facebook that are relevant to manifestation of disaster response activities will help social media designers and content providers creating new features or improving existing features of social media. For example, creating *an automatic recommendation system* that provides emergency information such as nearest shelter location, aid distribution channel, transport route etc., would be helpful in times of crisis, utilizing location-based technologies and services, like weather notification. A limitation of this study lies in the tenets of qualitative research (Lincoln and Guba 1985). The generalizability of the findings may be limited due to the interpretive nature of this research and the selection of a single case study based on one disaster type and one social media technology. The use of Facebook features in this study is not all-inclusive and there might be latent affordances enabled by other features. Future research can extend on identification and modelling of social media affordances in other disaster management phases (e.g. disaster recovery) or in other crisis situations as well as verification of these affordances in other settings. Such studies would also provide an opportunity for comparing affordances across a variety of technologies and contexts, which is critical to building a research stream on affordances (Majchrzak and Markus, 2012). Another valuable research avenue would be examining the working mechanisms or process by which users appropriate and interpret affordances and to further develop theory about how each affordance is actualized by individuals or group of individuals and how potential outcome (e.g. social change) emerge from the various individual actualizations. It is our hope that this research could encourage more research about the use of emerging technologies in addressing a variety of societal challenges and therefore enrich the IS research avenue.

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