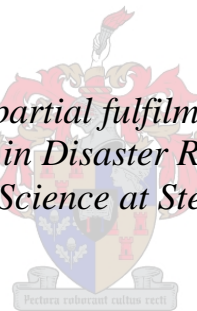


How People Affected by Disaster use Social Media: A Study of Facebook usage during the 2017 Garden Route Fires

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*Research Thesis presented in partial fulfilment of the requirements for the
degree of Master of Philosophy in Disaster Risk Science and Development in
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DECLARATION

By submitting this research Thesis electronically. I declare that the entirety of the work contained therein is my own original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

On June 7, wildfires began in Knysna and burned along a fire line for 300km, also affecting neighbouring Sedgefield and Plettenberg Bay (Knysna-Plett Herald 2017). The major fires burned between June 7 and June 11, however small smouldering fires continued for nearly two weeks (Knysna-Plett Herald 2017). Social media, which has become part of everyday life across the world (Fraustino, Liu & Jin 2012), was found to be a resourceful component to the management of the Garden Route fires. The one-to-many nature of Twitter and Facebook has shaped an opportunity for stakeholders and the public to distribute crisis-relevant messages, and to access large amounts of information they may not otherwise have (Fraustino, Liu & Jin 2012). There is extensive literature on social media in South Africa, as well as academic literature on disasters in South Africa. However, other than an article by Skinner and Rampersad (2014), no research has linked social media use to any specific disaster in South Africa. Since majority of the articles found on social media tend to focus on Twitter use, the unit of analysis for this thesis is Facebook.

This research aims to fill the above-mentioned gap in literature, with a view to optimise the potential of social media as a communication tool, for disaster risk reduction, and to improve response during emergencies. This research examines how people used social media during the wildfires that affected the Garden Route communities in June 2017 and whether the results are similar to those found during other disasters in different parts of the world. The overarching aim was to determine how people affected by a disaster event use social media, and whether there are common ways that they communicate. Further focus was given to determining whether certain formats of messages and ways of communicating were more popular than others.

Based on the results from the 2017 Garden Route fires, disaster-affected people may communicate in common ways on social media. Facebook proved to be an effective channel of communication throughout the disaster, and it continues to be, with the *Knysna Fires 7th June 2017* Facebook page still receiving messages related to the disaster event. Results showed that messages posted on the *Knysna Fires 7th June 2017* Facebook page could be classified into four main categories: Information-related, action-related, emotion-related, and opinion-related. These are the same four categories that were used to analyse social media use during the 2008 Sichuan earthquake, the 2010 Yushu earthquake, and the 2014 Hazelwood Mine fire. Based on the literature findings from this research, there are common things that disaster affected people do and say on social media, regardless of disaster type and demographics. The findings of this research highlight that photo and video messages that were accompanied by a text description to give context to the photos or videos were the most

popular message format and thus received the most responses from Facebook users. The photos and videos helped to graphically show the extent of damages in areas affected by the fire. Since photo and video messages received such a high number of responses, it is recommended that both the public and disaster management officials make greater use of these formats to communicate during future disasters. Authorities can use social media platforms such as Facebook as an additional tool for disseminating emergency information to the public.

Keywords: Social Media; Facebook; Disaster management officials; Communication; Emergency information.

OPSOMMING

Op 7 Junie 2017, breek verwoestende weghol veldbrande in Knysna uit. Dit strek oor 'n gebied van 300 km, selfs sover as Sedgfield en Plettenbergbaai (Knysna-Plett Herald 2017). Die brande word onverpoos vanaf 7 tot 11 Junie 2017, en kleiner smeulende vure word nog vir byna twee weke opgemerk (Knysna-Plett Herald 2017). Sosiale media, wat deel vorm van die alledaagse lewe oral in die wêreld (Fraustino, Liu & Jin 2012), is vindingryk aangewend deur die krisisbeheer spanne van die Tuin Roete ramp. Die een-tot-baie aard van Twitter en Facebook skep geleenthede vir belanghebbendes en die publiek om krisis-verwante boodskappe te versprei en om groot hoeveelhede inligting te bekom. (Fraustino, Liu & Jin 2012). Daar is groot hoeveelhede literatuur in verband met sosiale media, asook akademiese literatuur oor rampe in Suid-Afrika beskikbaar. Dit blyk egter dat sosiale media nie aan enige spesifieke ramp in Suid-Afrika gekoppel word nie, behalwe vir 'n artikel van Skinner en Rampersad (2014). Die meerderheid van die artikels wat op sosiale media gevind word, is op Twitter. Om hierdie rede gebruik die tesis Facebook as studie eenheid.

Hierdie navorsing poog om die bogenoemde navorsingsgaping te vul met die oog op die optimalisering van sosiale media as 'n kommunikasie-instrument om ramprisiko's te verminder en om die respons in noodsituasies verbeter. Dit bepaal die aard van die gebruik van sosiale media tydens veldbrande in die Tuinroete-gemeenskap in Junie 2017 en vergelyk dit met die resultate van soortgelyke rampe elders in die wêreld. Die oorkoepelende doel was om te bepaal hoe die rampgeteisterde persone, sosiale media gebruik, en of daar algemene maniere is waarop hulle kommunikeer. Verder is daar gefokus op tipes boodskappe en die wyse van kommunikasie, en of daar voorkeure was.

Bevindinge gebaseer op die Tuinroete-brande van 2017 toon dat persone betrokke by rampe soortgelyk kan kommunikeer op sosiale media. Dit is gevind dat Facebook 'n effektiewe kommunikasiëkanaal tydens die ramp was en dat daar steeds inskrywings op die betrokke blad verskyn wat verband hou met die gebeure. Die boodskappe wat op die Knysna Brande Facebook blad geplaas is, kan geklassifiseer word in vier hoofkategorieë: Inligting-, aksie-, emosie- en meningsverwant. Dit is dieselfde vier kategorieë wat van toepassing was op die 2008 Sichuan Aardbewing, die 2010 Yushu Aardbewing, en die 2014 Hazelwood Mine-brand. Dus blyk dit dat daar ongeag die aard van die ramp of die demografie daarvan, heelwat ooreenstemming is in die interaksie van rampgeteisterde individue op sosiale media. Foto- en videoboodskappe met 'n teksbeskrywing wat die konteks van die foto of video toelig, was die gewildste boodskaptipe en het dus die meeste reaksie van Facebook-gebruikers ontvang. Die foto's en video's het die omvang van skade in gebiede wat deur die brand geraak word, grafies uit gebeeld. Aangesien foto- en video-boodskappe groot

reaksie uitgelok het, word dit aanbeveel dat die publiek en rampbestuursbeamptes gebruik maak van hierdie tipe boodskappe in die toekoms. Betrokke hulpverleningsinstansies kan gebruik maak van Facebook as ekstra bron om noodinligting oor te dra aan die publiek.

Sleutelwoorde: Sosiale Media; Facebook; Rampbeheer beamptes; Kommunikasie; Noodinligting.

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ACRONYMS AND ABBREVIATIONS

DHS	Department of Homeland Security
DRRM	Disaster risk reduction and management
e.g.	For example
EPICs	Empowering the Public with Information in Crisis
i.e.	In other words/ that is
No.	Number
Photos	Photographs
NEIC	The National Earthquake Information Center
UNDP	United Nations Development Plan
UNISDR	United Nations International Strategy for Disaster Reduction
US	United States
Videos	Videography
%	Percentage

1 INTRODUCTION

1.1 BACKGROUND

On June 7 2017, wildfires began in Knysna and burned along a fire line for 300 kms, affecting Sedgefield and Plettenberg Bay too (Knysna-Plett Herald 2017). Although the major fires burned between June 7 and June 11, small smouldering fires continued for nearly two weeks (Knysna-Plett Herald 2017). The fire disaster damage register compiled by the Knysna Municipality indicated that 1,059 houses were destroyed by June 29 and that seven people lost their lives (Knysna-Plett Herald 2017; The Citizen 2017). Several people took to social media as a source of comfort, and to seek information on the fire event. The public's understanding and response to the disaster was greatly shaped by a social media platform called Facebook, where discussion groups were created during and following the disaster.

During a disaster, an important challenge for management is the exchange of information and communication in what is typically a highly uncertain and complex environment (Kapucu 2006). In these conditions, information and communication needs are not only changing continuously, but are unpredictable and diverse, in terms of their urgency, scope, and information type (Comfort & Kapucu 2006). Therefore, effectively organising relevant information across and among stakeholder groups can be a substantial challenge. Social media platforms such as Facebook and Twitter are now extensively recognised as playing a progressively influential role in the distribution of information during crisis events, including human-made crises and natural disasters (Bruns & Burgess 2014; White 2011). Social media platforms have been critical and largely positive tools in recent disasters from the 2011 Great East Japan earthquake and tsunami (Antoniou & Ciaramicoli n.d; Acar & Muraki 2011), 2011 Queensland floods in Australia (Bruns & Burgess 2014), 2011 Christchurch earthquakes in New Zealand (Bruns & Burgess 2014), 2013 Calgary Floods in Western Canada (Antoniou & Ciaramicoli n.d; Montgomery 2013), 2015 earthquake Nepal (Noubel 2015), and even the 2013 Boston Marathon bombings in the United States (Holman, Garfin, & Silver 2014). Social media has been utilised by emergency management organisations and by the general public for seeking advice and sharing information about the present situation on the ground (Brengharth & Mujkic 2016).

Content gathered from various social media platforms is now also being included into the overall management of events by some emergency management institutions (Meier 2015). However, there are negatives to social media use during disasters. To some degree, social media can be negatively correlated with age. According to Alexander (2013), conventional sources of news are preferred by those over the age of 55. The degree of adoption of social media differs from country to country as

well as from region to region. The dissemination of false or misleading information is possibly the largest negative associated with social media use during disasters (Alexander 2013).

There are numerous definitions of social media in the literature, all of which recognize its capacity to create and enable information exchange. For example, Gupta and Brooks (2013: 18) define social media as:

All the devices and platforms that allow users globally to virtually create and share information with each other. 'Platforms' are the virtual spaces that allow users to come together, and create and share information. Devices are the computing technologies that enable users to access the platform.

Social media has become part of everyday life across the world (Fraustino, Liu & Jin 2012). The one-to-many nature of Twitter and Facebook has shaped an opportunity for stakeholders to distribute crisis-relevant messages, and to access vast amounts of information that they may not otherwise have (Fraustino, Liu & Jin 2012). Another side to the use of social media during disasters is that it encourages the participation of the public (Fraustino, Liu & Jin 2012). The public is most often interested in being helpful during emergency circumstances, and they are often the first responders on the ground (Fraustino, Liu & Jin 2012). Community resiliency and the ability to withstand and rebound from emergencies are improved by individuals who can solve problems at the lowest level possible (Acar & Muraki 2011). Social media can help engage and empower individuals from all layers of society to address response and recovery needs, sometimes even without government involvement (Acar & Muraki 2011). If agencies effectively influence social media and traditional channels to communicate the needs of an emergency situation to the public, this empowers the public to develop and implement their own solutions. If the community is empowered to participate actively in a response, they will then continue to find ways to actively cope with hardships, mobilise, and solve problems; thus making the transition to recovery occur more quickly (Acar A & Muraki Y 2011).

Authorities can use Facebook and Twitter sites as extra tools to disseminate emergency public information. Individuals can follow a particular agency's profile and sign up to receive notifications even when they are not logged into the site (Acar A & Muraki Y 2011). Agencies can also leverage site features like discussion boards and comments to encourage engagement, information sharing, and interaction within the community and between the community and official response agencies. Many social networking platforms provide members with the ability to develop their own groups. Such groups could coordinate and facilitate volunteer efforts that would aid in repatriation and reintegration efforts after a disaster (Brengearth & Mujkic 2016).

1.2 RESEARCH PROBLEM

Effective communication management is a vital tool in the management of a disaster (Li et al. 2011). If the process of communication is difficult in our ordinary and daily lives, it is a lot more challenging in times of disaster (Skinner & Rampersad 2014). Difficulties include responding with accurate, complete, and understandable information as fast as possible during a disaster, as well as communicating in a proactive way that includes community members (Nyondo 2006). Social media platforms, such as Twitter and Facebook, offer a rich source of real-time information about real-world events, particularly during mass emergencies and provide a fast and efficient way of communicating with and between the public (Yin et al. 2015). Examining information from social media offers valuable insight into time-critical circumstances for emergency officers and the public to understand the impact of hazards and respond timeously (Yin et al. 2015).

Although authorities do not depend on social media for information, it is a useful tool that can produce greater insight into a disaster (Nyondo 2006). Given the increasingly important role that social media plays as a source of information during disasters, it is essential to understand how social media is used during disasters and what remains to be tested (Nyondo 2006). Information posted on social media is not always the same as that shared by traditional media (Nyondo 2006). Social media also provides real-time information whereas other forms of media may lag behind what is happening on the ground. It is therefore important that social media is monitored and understood by authorities during a disaster (Nyondo 2006). If not, authorities may miss important information and opportunities to engage with members of the public during a crisis (Nyondo 2006). The literature on social media use during disasters identifies several gaps. Palen et al. (2010: 4) argued that “one issue which is still not well studied, especially in South Africa, is whether commonalities exist in how people affected by disasters use the Internet.”

Another issue concerns the format (e.g. Photographs (photos), videography (videos), or text) that people are mostly likely to respond to (Kulemeka 2014). The question is whether there are patterns with respect to how people use social media in response to disasters and how they respond to other tweets and Facebook posts (Kulemeka 2014). Understanding this question can help create a theoretical model of how people use social media during disasters (Kulemeka 2014). More importantly, it can help the authorities to identify ways of tailoring content to reach members of the public more effectively.

Qu, Wu, & Wang (2009), Qu et al. (2011b), and Kulemeka (2014) examined how people affected by disaster use social media. These three studies, which categorised social media messages into the

different ways in which people communicate, found similar results. The results revealed that there are similar patterns in how people affected by disaster communicate via social media. Whether these findings are applicable to a disaster in South Africa is yet to be explored. There has been very little research on the use of social media during disasters in South Africa. A few studies made mention of Africa as a whole, but did not relate the information to South Africa specifically. Majority of the literature on social media in South Africa has not focused on areas along the Garden Route nor focused analysing various messages that have been sent via social media. Authorities in South Africa are also not engaging fully with the potential of social media, leaving them behind the curve in emergency situations (Kunguma & Skinner 2017).

A study by Skinner and Rampersad (2014) that focuses on communication strategies for effective disaster risk reduction in Durban, KwaZulu-Natal, is one of the very few articles found that focuses explicitly on social media and disasters in South Africa. Bean et al. (n.d.: 43) acknowledges the connection between disasters and social media use in South Africa, though the article simply characterises social media as “an emergent technology receiving much attention from marketing and public relations spheres”. The authors explain that “First-hand reports via social media are expected to be most valuable during initial damage assessment and the critical response period prior to a disaster” (Bean et al. n.d.: 43). Although Bean et al. (n.d.) acknowledges social media use during disasters in South Africa, the article does not focus on any specific disaster. Kunguma & Skinner (2017: 1) highlights the potential benefits of using social media in disaster risk management, arguing that “mainstreaming media into disaster risk reduction and management (DRRM) activities could make it a more effective functioning component of DRRM in planning and implementation of disaster risk reduction strategies.”

There is extensive literature on social media in South Africa, as well as literature on disasters in South Africa. However, other than the above-mentioned article by Skinner and Rampersad (2014), no one has linked social media to any specific disaster in South Africa. Majority of the papers found on social media tend to focus on Twitter use, whereas the use of platforms like Facebook remains largely unexamined. Therefore, this thesis aims to begin filling these research gaps, with a view to optimising the potential of social media as a communication tool for both disaster risk reduction and for improving response during emergencies. This thesis examines how people used social media during the wildfires that affected the Garden Route communities in June 2017, and compares the results to how people used social media during disasters explored in Qu, Wu, & Wang (2009), Qu et al. (2011b), and Kulemeka (2014). This thesis also focuses on the use of Facebook as opposed to other social media

platforms. Although the Garden Route includes several towns, for the purpose of this thesis, the Garden Route refers to Sedgefield, Knysna, and Plettenberg Bay where the primary fires occurred.

1.3 RESEARCH AIM AND OBJECTIVES

The overarching aim is to determine how people affected by disaster use social media, and whether there are common ways that they communicate. Further focus is given to determining whether certain types and formats of messages and ways of communicating were more popular than others. Specific objectives of the research include understanding:

- How social media was used by members of the public during the Garden Route fires.
- How the Garden Route community reacted to the wildfires in terms of the types of messages that were posted, and the responses they elicited.
- Whether results from research by Qu, Wu, & Wang (2009), Qu et al. (2011b), and Kulemeka (2014) are also applicable to how people use Facebook in South Africa and thus whether the content and characteristics of engagement differs between countries/regions. This will determine whether there are common ways that people affected by disaster communicate on social media.
- Which format of Facebook messages (e.g. video, photo, text, etc.) people used most often.
- If and how the types and formats of Facebook messages changed over time from the response stage (Phase 1) to the recovery stage (Phase 2).
- Recommendations for improving how disaster management and other authorities communicate with members of the public based on how the public uses social media during disasters. Extends

1.4 THE GARDEN ROUTE FIRES OF JUNE 2017

Knysna is a small town located in the heart of the Garden Route¹ in the Western Cape Province of South Africa. It lies 34° south of the equator is characterised by fynbos and indigenous forest, which is the largest closed-canopy forest in Southern-Africa (SA-venues 2018). Although the data that is used in this study is from a Facebook page titled *Knysna Fires 7th June 2017*, the fire largely affected Knysna, Plettenberg Bay, and parts of Sedgefield. The Facebook posts are therefore not necessarily confined just to Knysna but rather more broadly to the Garden Route; for this reason, the wildfires are referred

¹ The Garden Route is a stretch of the South Western Cape in South Africa covering roughly 300 kilometres (Empty Shack 2017). It extends from Mossel Bay in the Western Cape to Storms River in the Eastern Cape (The Shack 2017). This Thesis refers to the Garden Route Fires; this does not include the whole 300km strip of land, but rather Knysna, Sedgefield and Plettenberg Bay where the primary fires occurred.

to as the 'Garden Route Fires' in this thesis. Sedgefield and Plettenberg Bay hold similar characteristics and are located adjacent to Knysna along the Garden Route (Figure 1.4.1). On June 7, wildfires began in Knysna and burned along a fire line for 300km (Knysna-Plett Herald 2017). The major fires burned between June 7 and June 11, however small smouldering fires continued for nearly two weeks. Knysna was hardest hit, with 263 houses damaged or destroyed in the Knysna Heights suburb alone (Knysna-Plett Herald 2017). The fire disaster damage register compiled by the Knysna Municipality indicated that 1,059 houses were destroyed by June 29 and that seven people had died (Knysna-Plett Herald 2017; The Citizen 2017).



Figure 1.4.1 Map showing the location of Sedgefield, Knysna, and Plettenberg Bay in the Western Cape, South Africa.

2 LITERATURE REVIEW

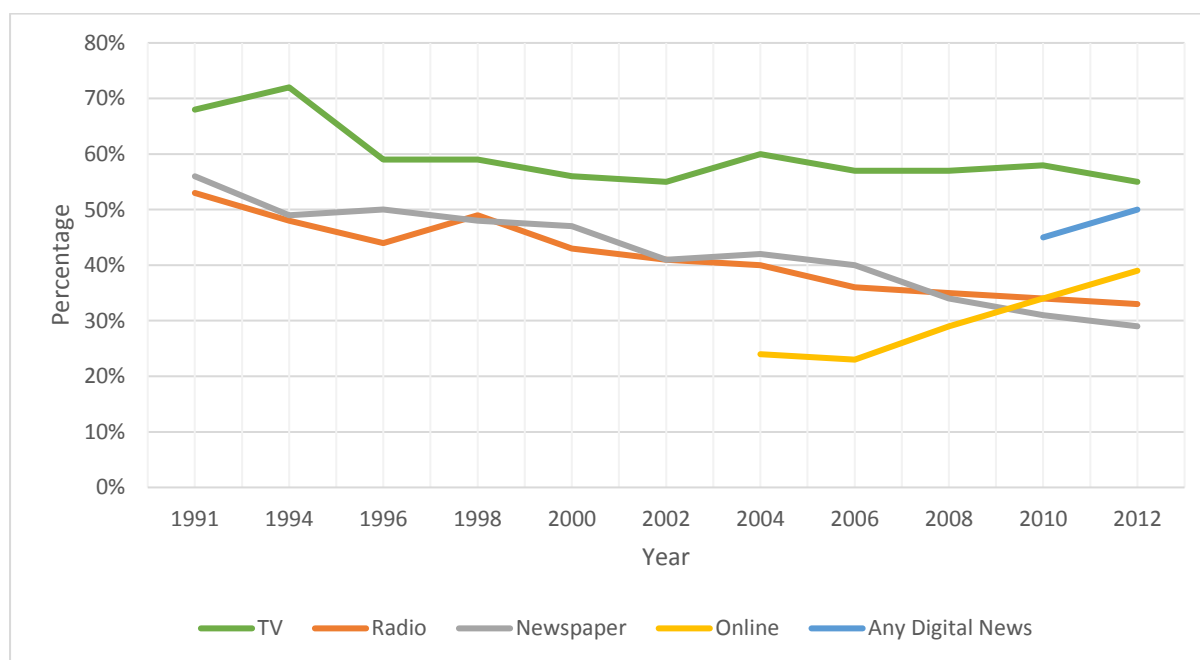
Literature on social media and disasters suggests that people communicate with one another in certain ways through social media platforms such as Facebook. It also suggests that emergency responses can be strengthened when both the public and authorities understand and use different social media platforms as a tool to disseminate messages during a disaster. This chapter looks at how disaster communication has evolved over time and how disaster managers/officials and the public are using social media during times of disaster today. The literature review also discusses how social media may contribute to situational awareness and what different technologies are used on social media. This chapter concludes with evidence on whether there are patterns in how social media is used during disasters.

2.1 A CHANGING MEDIA ENVIRONMENT

The communication landscape has been irreversibly altered by social media and the internet (Haddow & Haddow, 2014). The current media revolution that is being experienced rivals the effects of earlier inventions such as the telephone, printing press, photos, television and radio (Haddow & Haddow, 2014). The speed of communication and accessibility of information has been vastly improved by the internet, not to mention the new format of news it presents (Haddow & Haddow, 2014). Although social media has increased access to information and allows people to engage with events in real time, the social media revolution also has a darker side in the sense that it creates opportunities for the sharing of incorrect, biased, or 'fake' information. From a disaster management point of view, this can make responding more difficult. Rich (2013: 6), a former New York Times columnist, stated that "we didn't recognise we were up against change as sweeping as the building of the transcontinental railroad or the invention of electricity." As Haddow and Haddow (2014) note, the old style of emergency communication, where professionals would broadcast one message to many recipients, is obsolete. These days communication is an interaction between the many and the general public are all consumers, producers, and curators of information. Glaser (2006: 5), executive editor of MediaShift explained that "the audience knows more collectively than the reporter alone." Social media platforms such as Twitter and Facebook have emerged as new information providers (Haddow & Haddow, 2014). Furthermore, 80% of people in the US now have mobile connection to the internet through various devices such as smartphones and tablets (Haddow & Haddow, 2014). This means that people are now able to create, access, influence, or share news wherever and whenever they wish.

According to the Pew Research Center (2010b: 2), "in this new multi-platform media environment people's relationship to news is becoming portable, personalised, and participatory." There is

evidence that suggests society's need and appetite for news has increased (Pew Centre, 2010b). Researchers from the Pew Research Centre's (2013: 8) Excellence in Journalism Project stated that people "are consuming more news than they had in the past". People's interest and reliance on news linked to the internet and social media sources has increased alongside a decline in people's consumption of news linked to traditional sources (Haddow & Haddow, 2014). Data collected by the Pew Research Center on news consumption habits, shown in Figure 2.1.1, concluded that more Americans obtained their news online than from traditional sources such as radios or newspapers (Haddow & Haddow 2014). This study, conducted in 2013, consisted of a survey of more than 2,000 adults in the U.S. Furthermore, the data showed that double the number of people relied on social media as a news source in 2012 than 2010 (Haddow & Haddow, 2014). Haddow and Haddow (2014) argue that before we can understand disaster communications in a changing media world, we need to better understand the changes that are occurring in the media world (Haddow & Haddow, 2014).



Source: Pew Research Centre (2013)

Figure 2.1.1 Percentage of respondents who received news from each platform

2.2 DISASTER COMMUNICATION

In the past, majority of the literature speaking to disaster communication has focused on risk or crisis communication (Houston et al. 2014). Crisis communication studies are generally found in organisational communication and public relations literature and focus largely on exploring approaches that can protect an organisations image during a disaster. Risk communication studies on the other hand are commonly centred on understanding how to change a person's behaviours, risk

knowledge and attitudes (Houston et al. 2014). Risk and crisis communication are equally important in disaster communication (Witte 1995), although, disaster communication also focuses on objectives beyond those prioritised in risk and disaster communication literature. Disaster communication has traditionally been understood as occurring mainly through the mass media (Rodriguez et al 2007); disaster warnings, which came from official government agencies, were circulated through mass broadcast stations.

News regarding disasters generally gains the most attention in comparison to other news topics (Houston et al. 2014). Generally and traditionally, disaster news broadcasts substantially shape and influence how the government and the public view, understand and reacts to disaster (Robinson 2007). This highlights how influential and important mass media are in shaping behaviour, attitudes and individual disaster knowledge (Robinson 2007). A weakness of mass media broadcasts is that they are usually disseminated to the public from one source which allows for very little opportunity for participation and response (Pew Research Center 2010a). The evolution of social media networks and technologies, however, offers opportunities for two-way communication (Fraustino, Liu & Jin 2012). With the potential that social media has for enriching disaster communication, it is not surprising that it has captured the attention of officials and disaster managers (Houston et al. 2014).

There has been a tendency to concentrate on studying communication and information technologies from the viewpoint of emergency response management (Qu, Wu & Wang 2009; Schaefer, Ganoë & Carroll 2007). Recently, a minor but rapidly expanding body of literature has exposed the potential of communication and information technologies in “citizen-driven emergency response” (Qu, Wu & Wang 2009:1). In 2004 and 2005, the Gulf coast of the US was hit by hurricanes. Throughout and after the hurricanes, public libraries gave people in affected areas access to the internet, which was extremely important to the affected communities (Jaeger et al. 2007). Affected residents used those library computers to search for updates and news to communicate with family and friends, find displaced or missing people, and gather information on weather conditions (Jaeger et al. 2007).

Studies into the Pentalk Network revealed similar findings to the 2004 and 2005 Gulf Coast hurricanes. The Pentalk Network is a computer network that was created in 2001 for farmers in the United Kingdom during the foot and mouth epidemic (Hagar & Haythornthwaite 2005). The research showed how the computer network provided a virtual platform for interpersonal contact, mutual aid between farmers during this devastating time, and community discussions on important issues (Hagar & Haythornthwaite 2005). More recent research also indicates that the public look for information from

every source available immediately following a disaster in order to understand the situation, irrespective of whether the information comes from an official source or not (Sutton, Palen & Shklovski 2008). Torrey et al. (2007) also revealed that online communities can play a crucial role in improving trust in and providing access to information during the provision of disaster relief.

2.3 SOCIAL MEDIA DEFINED

Definitions of social media differ greatly in their focus, complexity, and in their relevance outside their home discipline (Carr & Hayes 2015). There are definitions of social media used in both the communication discipline and from various associated disciplines such as mass media, information science, and public relations (Carr & Hayes 2015). This diversity of definitions means, however, that there is still no concise, formal, and mutually-agreed upon definition of social media (Effing, van Hillegersberg, & Huibers 2011; Xiang & Gretzel, 2010), particularly across disciplines. Typically, definitions that centre on the idea of *social media* denote digital technologies underlining interaction or content generated by the user (Kaplan & Haenlein 2010 & Terry 2009). Often social media is referred to by channel characteristics, identifying either directionality of messages or using specific tools like Facebook or Twitter to exemplify modes of interaction (Carr & Hayes 2015). The abundance of definitions makes it difficult to form and share the understanding needed to direct research and theory.

Some definitions are fairly simple and focus on the nature of the message structure in social media. Lewis (2010: 2) states that “social media simply serves as a label for digital technologies that allow people to connect, interact, produce and share content”. Kaplan and Haenlein (2010:61) define social media as “a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content”. Russo et al. (2008: 22) states that social media platforms are “those that facilitate online communication, networking, and/or collaboration”. However, these definitions pose a problem because they can be easily applied to various different communication technologies, including email, and do not incorporate the social and unique technological affordances that distinguish social media (Carr & Hayes 2015).

Howard and Parks (2012: 32) offer a more expansive definition of social media, which contains three parts: “(1) the information infrastructure and tools used to produce and distribute content; (2) the content that takes the digital form of personal messages, news, ideas, and cultural products; and (3) the people, organizations, and industries that produce and consume digital content”. These authors

go on to state that social media is often represented in literature with reference to applications such as Twitter, YouTube, or Facebook, rather than by their characteristics and qualities (Howard & Parks 2012). Although this definition gives a deeper explanation of social media, it emphasises the tools and fails to explain the potential and actual social effects of those tools. Howard & Parks' (2012) definition also restricts contributions to building theory which in turn limits how applicable it is to descriptive studies (Carr & Hayes 2015).

Other definitions of social media developed outside of the fields of communication science. In the medical field, Terry (2009: 2) defines social media as a "user-generated content utilising internet-based publishing technologies, distinct from traditional print and broadcast media". In public relations social media is defined by Kent (2010: 645) as "any interactive communication channel that allows for two-way interaction and feedback". In addition, Kent (2010: 645) argues that social media has the "potential for real-time interaction, reduced anonymity, a sense of propinquity, short response times, and the ability to 'time shift', or engage the social network whenever suits each particular member". Both of the above two definitions distinguish between traditional or social media. However, they do not necessarily dismiss other 'new media' like WhatsApp and email, which are generally not counted in typical lists of social media (Carr & Hayes 2012). Carr & Hayes (2015:8) drawing too on Terry's (2009) and Kent's (2010) definitions define social media as:

Social media are Internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others.

This definition of social media will be used throughout this thesis.

2.4 FACEBOOK

Facebook, which was founded in 2004, and is a social networking service that links people from all over the globe. It focuses on building and involving social relations amid people who share mutual interests and experiences (Arad, Barzilay & Perchick 2012). Facebook users create a Facebook account and a 'profile' that contains information about themselves. A person's Facebook profile contains a 'wall' where the user can share information, such as text, videos, photos, and web links, with other users, which they can in turn make comments on (Arad, Barzilay & Perchick 2012). Emergency managers can use Facebook in several ways by using its multitude of applications for individual accounts, as well as other applications for communication within a group (Arad, Barzilay & Perchick 2012). There are two types of Facebook groups; a *like* page, and a *group* page (White 2011). A *like*

page is generally run by a single user; although several people can view and comment on information posted on the *like* page, only the user who created the page can post content (White 2011). A *group* page allows for more open communication where everyone who joins the group can post content (White 2011). The groups are usually given a title and content is generally posted based on and with links to the title (White 2011). Facebook users can respond to messages within a group by reacting to the message, sharing the message, or commenting on the message. In February 2016, Facebook's *Reaction's* functions were released (Tian et al. 2017). Instead of only allowing users to "like" a Facebook post, they can react to the post by choosing one of six options: Like, Love, Haha, Wow, Sad and Angry (Figure 2.4.1) (Tian et al. 2017).



Source: Screenshot from Author's Facebook page. 12 September 2018

Figure 2.4.1: Facebook reactions

Facebook can be very useful for officials and emergency organisations because they can create a group with information regarding a current or expected disaster or emergency (White 2011). Although this information will only reach those who have access to this specific social network, it may still reach social media users who would otherwise not have received the information (Trottier & Fuchs n.d.). This information can then be passed on to others verbally or shared through other forms of social media.

Facebook is also a way to reach those who do not use Twitter (White 2011). Many people who use Facebook do not make use of twitter, and vice versa. There are advantages and disadvantages to both Facebook and Twitter. The most obvious difference between the two is that Twitter is limited by 140 characters (letters, full stops, emoticons, etc.). This character limit encourages short and to the point

messages, whereas Facebook allows for numerous characters to be used, which often brings about cluttering of information (White 2011). There are both advantages and disadvantages to limited messages on Twitter and more extensive messages on Facebook (although short messages may also be posted on Facebook). Short messages are often 'to the point' and specific, ensuring that the most important information is communicated to the public (White 2011). While this allows for precise messages and a quicker reading time, it may lack necessary explanations that better explain a situation (White 2011). While slightly longer messages can be beneficial where explanations are required in full to understand a situation better (White 2011), longer messages are more time consuming to read and may become confusing if too much information is posted at once. What separates Facebook from other social media sites is that it combines many communication, information, and media technologies, such as digital images and videos, discussion groups, webmail, webpage, and search engines (Trottier & Fuchs n.d.).

2.5 SOCIAL MEDIA TECHNOLOGIES

2.5.1 PHOTOGRAPHY SHARING

Many devices such as digital cameras and smartphones have built-in digital capabilities (DHS 2012). People now have the ability to upload these images to several social media sites such as Instagram, Facebook, Flickr, and Twitter (White 2011). Images may be uploaded in numerous ways with a simple touch of a screen. Because of this, images are very easy to 'move' during times of emergency, thus images are easily and more quickly distributed (DHS 2012). Furthermore, particular places can be tagged on photographs in order to draw attention to particular pieces of information (DHS 2012). Pictures can be accompanied by a description, which can provide critical details to help responders clarify what is happening on the ground (DHS 2012). On both Facebook and Twitter, numerous images may be uploaded at the same time and the location at which these pictures were taken can be added (White 2011).

2.5.2 VIDEO SHARING

Videos can be used to enhance disaster response capacities (DHS 2012). Photo, video, and other streaming visuals also provide useful information for response and recovery efforts (White 2011). In any emergency, the public are the first responders because they are the ones who are affected directly by the event (DHS 2012). Often, family members check on one another first, then look for their friends and neighbours. The public's technology can be utilised to visually assess damage much faster than emergency managers can (DHS 2012). Just like photos, videos paint a picture of events, particularly with respect to the location of community members (DHS 2012). Videos can be uploaded and created

on both Twitter and Facebook, and can include location information attached to data (DHS 2012). These videos are a useful way to gain real-time information from the ground for situational awareness. Additionally, videos are useful for distributing preparedness information, usually giving context that is not communicated easily via text (DHS 2012).

2.6 SOCIAL MEDIA AND DISASTERS

Emergency managers, members of the public seeking additional information, and those impacted by disasters increasingly use social media to communicate (Dufty 2014). Because social media is still a fairly new phenomenon, it has only been used extensively in disaster warning, response, and recovery since 2010 (Dufty 2014). In particular, social media has been used to disseminate warnings to people, and to help in coordinating response and recovery. As noted earlier, social media has been a critical and largely positive tool in recent disasters (Antoniou & Ciaramicoli n.d; Acar & Muraki 2011; Bruns & Burgess 2014; Bruns & Burgess 2014; Antoniou & Ciaramicoli n.d; Montgomery 2013; Noubel 2015; Holman, Garfin, & Silver 2014). Social media platforms have been used during disasters by members of the public, local authorities, and emergency management organisations to share advice and information (Brengharth & Mujkic 2016).

2.6.1 HOW DISASTER OFFICIALS USE SOCIAL MEDIA BEFORE A DISASTER

2.6.1.1 PREPAREDNESS

Preparedness comprises action taken by international organisations, local government, communities, and non-governmental organisations to strengthen administrative abilities with the aim of mitigating negative hazard-related effects that may occur (Kunguma & Skinner 2017). Preparedness plans include various components, such as relevant response officials, early warning systems, procedures, communication systems and evacuation routes, community awareness and education, and vulnerability, capacity, and hazard identification (Kunguma & Skinner 2017). Often, preparedness involves removal of property and people from a threatened location (UNISDR 2002). Throughout this process, social media and other forms of media, can play an important role as a platform for communicating the preparedness plans (UNISDR 2002). The role of social media within this context, however, has not been explored extensively in official documentation and is not continuously recognised in the efforts of disaster managers, procedures, and policies (UNISDR 2002).

2.6.1.2 MITIGATION

For mitigation strategies to be successful, they should reduce the potential for disasters (UNISDR 2002). When mitigation plans are developed, the core intent should be to recognise safety where

communities frequently take sensible precautions by being conscious of, but not frightened, by the possibility of an occurring hazard (Coburn, Spence & Pomonis 1994). Thus a 'safety culture' should be developed. The intended actions need to be hazard-specific and seek to reduce the vulnerability of communities and structures; for example, where strong winds are a hazard, buildings need to be strong and wind resistant (Dey & Singh 2006). Hazard information should be included in communication posted on social media, with suitable mention in media programmes of the relevant hazards (Kunguma & Skinner 2017). Conversely, exaggerated social media articles can frighten the community instead of raising awareness. A good ongoing relationship with disaster risk reduction personnel can aid in creating a balance (Kunguma & Skinner 2017).

2.6.1.3 PREVENTION

Prevention includes every measure put in place to prevent a hazard or a subsequent disaster (South Africa 2002; UNDP 2010). For this to work, advanced hazard knowledge and understanding of how a hazard can become a disaster needs to be obtained (Voogd 2004). Some examples of hazard prevention include building levees or dams for flood water control, or relocating settlements away from hazardous areas. Although these processes may not always include social media directly, it is important that social media users understand prevention methods in order to help mitigate responses, and report accurately where measures such as relocation result in negative reactions from those affected (Kunguma & Skinner 2017).

2.6.1.4 EARLY WARNING AND DETECTION

UNISDR (2004: 1) defines early warnings as "the provision of timely and effective information, through identified institutions, that allow individuals at risk of disaster, to take action to avoid or reduce their risk and prepare for effective response". When action is taken immediately, preparation and effective response reduces the impact of hazard or disaster events (Kunguma & Skinner 2017). Early warnings include prediction and forecasting of impending events and forwarding warning information to appropriate authorities to disseminate the information to the public. Social media can be used by authorities to disseminate these warnings in an effective and understandable way (Kunguma & Skinner 2017).

Kraut et al. (2013) described how The National Earthquake Information Center (NEIC) created an event detector that continuously studies tweets in order to detect the occurrence of an earthquake. The event detector monitors rapid rises in the frequency of keywords used in relation to earthquakes (Kraut et al. 2013). Worldwide the tool has been able to detect between one and four earthquakes

daily (Kraut et al. 2013). Although the accuracy of this tool is not as great as seismographs in establishing location or magnitude of the earthquake, it broadens coverage to reach areas where there is little instrumentation (Kraut et al. 2013). This tool also offers an alternative for if instruments fail. Earthquake detection using social media usually takes less than two minutes, whereas instrument readings can take up to five minutes (Kraut et al. 2013).

2.6.2 HOW DISASTER OFFICIALS USE SOCIAL MEDIA DURING AND AFTER A DISASTER

2.6.2.1 RESPONSE

Kunguma & Skinner (2017: 3) define response as the phase in which “the disaster management plan is executed to ensure that affected individuals’ lives are preserved, and their wellbeing’s not affected permanently, while adverse effects are mitigated”. Rescue and relief efforts are carried out during and immediately following an event, while later responses include reconstruction and rehabilitation (Donohue, Masilela, & Gear 2006). People living in the affected community are generally the first people to respond to any hazard or disaster, followed by emergency responders such as fire and rescue, paramedics etc. (Hermann 2007).

Social media can be a tool for helping to improve situational awareness during crises (Hughes, Palen & Peterson n.d.). Emergency managers and officials can monitor social media to gather information on conditions on the ground. Liu & Kaoru (2017: 258) define situational awareness as the “ability to identify, process, and comprehend critical elements of an incident or situation”. In terms of emergencies, ‘situational awareness’, refers to the perceptions and information people have of an event that enables them to analyse their situation, make decisions, and predict outcomes. This is essential during a crisis, where the outcomes of poor decision-making can be particularly damaging (Hughes, Palen & Peterson n.d.). Gaining real-time information as a crisis unfolds is necessary for officials to keep the public informed, locate where people are, and assess victims’ needs (Liu & Kaoru 2017). Disaster managers may also make use of this information to direct and distribute resources to people and areas in need. Social media information is useful because it often alerts officials to what is happening on the ground before they deploy, enabling them to plan and take along the most relevant supplies or resources needed (Johnson et al. 2011).

The in-depth analysis of tweets sent during the 2009 Red River Floods in North Dakota and Minnesota in the US and Manitoba in Canada is an example of how messages on social media contributed to situational awareness. Another example includes the 2009 Oklahoma City fires where relevant keywords such as #redrive and #okfires were searched on tweets (Vieweg et al. 2010). To enhance

situational awareness, tens of thousands of tweets were filtered by hand and studied by researchers in order to identify and extract relevant information such as flood-level updates or fire positions (Vieweg et al. 2010). Subsequently, a natural language processing classifier was created by Project EPICs (Empowering the Public with Information in Crisis), which filters text to provide responders with information on conditions on the ground (Hughes, Palen & Peterson n.d.).

During disasters, damage assessment is crucial (Giacobe & Soule 2014). It is important that emergency managers know where there is damage, particularly in large-scale disasters (Giacobe & Soule 2014). Whether it is flooding damage or a single building collapse, emergency managers must gather and assess information about the crisis. Information is needed on, for example, what number of houses have been flooded, how big the buildings that were affected are, and how extensive the damage has been (Giacobe & Soule 2014). Crowdsourcing is a good way to assess damage following very large disasters. This is done by viewing and synthesising photos that have been taken by the public and shared on social media (Giacobe & Soule 2014). Information can be collected by disaster managers, who deliver real-time data back to officials; this information can include photos taken from a safe distance with smartphones (Giacobe & Soule 2014). Once a disaster has occurred and the risk is reduced, obtaining exterior images of damaged buildings, for example, could offer response agencies and emergency officials with appropriate information to inform where immediate resources need to be sent for immediate rescue and recovery (Giacobe & Soule 2014). If situational awareness is high, disaster managers are more likely to receive a greater amount of information on the extent of damage caused by a disaster (Hughes, Palen & Peterson n.d.).

The benefits of crowdsourcing via social media was seen in the 2011 Haiti earthquake. This disaster event saw a high number of 'digital volunteerism'. Reilly & Antanasova (2016: 21) explain how "these volunteers helped pull information from a variety of online sources including Facebook, Twitter and blogging platforms in order to create a digital crisis map using the open source tool Ushahid". The map created from this process displayed the affected areas and revealed the full extent of the damage caused (Meier 2013). According to Meier (2013: 1):

Crisis-mapping technology has emerged in the past five years as a tool to help humanitarian organizations deliver assistance to victims of civil conflicts and natural disasters. Crisis-mapping platforms display eyewitness reports submitted via e-mail, text message, and social media. The reports are then plotted on interactive maps, creating a geospatial record of events in real time.

2.6.2.2 RECOVERY

Recovery includes the physical and psychological recovery of the environment and disaster victims through actions such as erecting temporary shelter and offering household basics (Kunguma & Skinner 2017). Short-term recovery activities include the clearing up of destroyed and damaged surroundings, supplying shelter, and providing access to water and food to those affected (Johnson 2000). These actions aid in safeguarding structures for communities and individuals to return to basic functional norms (Miththapal 2008). This is all done to make way for more permanent actions to be employed (Kafle & Murshed 2006). A well-managed disaster will ensure that those affected will be able to continue with their lives, and begin restructuring infrastructure such as schools, bridges, roads, and houses with state support (Kunguma & Skinner 2017). Ideally, recovery activities should be maintained until every community structure normalises (UNDP 2010). In addition, infrastructure should be re-built with future disasters in mind (UNDP 2010); For example, buildings with newly applied building and civil codes can be built back better to withstand a similar, future disaster. The benefits of recovery are that often better infrastructure is erected to replace what was damaged or destroyed; social media could help with campaigning for this to occur (Kunguma & Skinner 2017).

The dissemination of information by authorities via social media was seen in the 2013 Calgary floods (Montgomery 2013; Antoniou & Ciaramicoli n.d.). Following the evacuation, officials within the city sought to organise volunteers and brief them on upcoming events (Montgomery 2013). The volunteers, who were needed to help re-enter neighbourhoods, were requested to meet at McMahon Stadium (Montgomery 2013). Through several social media sites, this information was distributed quickly; this communication strategy was so successful that although only 6,000 volunteers were needed, almost 7,000 volunteers arrived at the stadium to help (Antoniou & Ciaramicoli n.d.; Montgomery 2013). The Canadian Red Cross was also very active on social media during the Calgary Floods. They used social media to share information, fundraise and to answer any requests or questions from those affected by the floods (Kaminska & Rutten 2014).

Another example was seen in Hurricane Sandy in 2012. The New York Governor Cuomo was very active on Twitter and sent roughly 400 tweets a day (Shelter & Preston 2012). These tweets gave situation updates, information, and shared photos about the storm, damages, and the power situation (Shelter & Preston). As a result, the Governors Twitter account gained popularity, reaching over 55,000 followers from only 20,000 followers before the storm (Antoniou & Ciaramicoli n.d.; Stelter & Preston 2012).

Rehabilitation occurs over weeks, months, and even years following a disaster (Kunguma & Skinner 2017). Rehabilitation includes the restoration of infrastructure, basic services, and livelihoods for communities (Kunguma & Skinner 2017). Following a disaster occurrence, victims often experience general mental health and 'Post Traumatic Stress Disorder' problems, which is why trauma care and counselling is often necessary to reduce future impairments. An appropriate rehabilitation programme needs a long-term goal that involves establishing a combination of community-based programmes and institute or medical-based rehabilitation (WHO 2005). Here, social media can be used to disseminate news on counselling facilitates (Vasterman, Yzermans & Dirkzwager, 2005). Therefore, social media can be beneficial in improving capabilities in emergency management and recovery and is likely to have a place in disasters and emergencies still to come (Mark, Al-Ani, & Semaan 2009).

2.6.3 HOW THE PUBLIC USES SOCIAL MEDIA BEFORE A DISASTER

2.6.3.1 PREPAREDNESS, MITIGATION, AND EARLY WARNING

Once an early warning has been disseminated on social media by officials or a member of the public, people usually seek online confirmation of these warnings prior to taking protective action (Kraut et al. 2013). This can become a problem as it increases the amount of time used to take appropriate action (Kraut et al. 2013). If the warnings come from a well-known source that has been acknowledged with previously disseminating accurate early warnings, perhaps the time between receiving the warning and taking action could be reduced (Kraut et al. 2013). The public need to be aware of what sources are legit and valid because false early warnings may become a serious problem and will reduce the trust and validity in messages disseminated by officials (Kraut et al. 2013). The public may also share this information on other social media platforms to inform more people of what is expected (Kraut et al. 2013). Other than early warnings, evacuation routes and information on how to approach the disaster is also generally discussed and shared by the public (Kraut et al. 2013). For the purpose of this research, however, the focus will be on how the public uses social media during and after a disaster, and not on early warnings before a disaster.

Traditionally, disaster preparedness measures, mitigation strategies, and early warning and alerts have come from officials who have studied these measures and have put forward the best strategies (Shklovski, Palen & Sutton 2008). From here the public could disseminate these messages to a wider community through social media platforms (Shklovski, Palen & Sutton 2008). We see an interesting case in that of the previously mentioned social media earthquake detector implemented by the NEIC.

Here, instead of officials alerting the public to an earthquake, it is the public who are alerting the authorities.

2.6.4 HOW THE PUBLIC USES SOCIAL MEDIA DURING AND AFTER A DISASTER

The core actions through this phase are rapid rescue, assessments, assistance and the delivery of supplies, evacuations and search missions (Global Education 2010). With each action, an informed public using social media, and an informed media can provide great assistance (Tucker 2011). The public would use social media for sharing information with each other as well as informing authorities of what is happening on the ground (Dufty 2014).

According to White (2011), social media use increases during times of disaster. After the Great East Japan earthquake in 2011, Twitter reportedly received a 500% increase in tweets, largely due to people trying to locate friends and family. Haddow, Bullock & Coppola (2017: 177) state that “during the initial stages of the Japanese earthquake, the volume of tweets being sent was up to 5000 tweets per second on 5 different occasions”. Dufty (2014) shows that the number of people following the Boston Police Station on Twitter increased from 40,000 to 300,000 during the Boston Marathon Bombings in 2013. During the California wildfires in 2007, people turned to social media for news as they felt that officials and journalists were slow in providing information about their areas (White 2011).

Before social media was used as a means of communication during disasters, communication channels usually flowed one-way, with emergency responders, fire-fighters, doctors, paramedics, etc., disseminating information to the public (Palen & Liu 2007). However, social media applications now provide members of the public with new opportunities for participating in disaster response and recovery (Meraz 2006). Social media provides a readily available and easily accessible platform for communicating with other members of the public and it facilitates information sharing and data gathering that could be strategically important for response activities (Hughes, Palen & Peterson n.d.). Social media is also able to achieve functions of support that could accompany crisis response strategies (Hughes, Palen & Peterson n.d.). Because of this, investigations were launched by crisis informatics researchers on these conducts and how they could be moulded for future ideas of emergency management (Hughes, Palen & Peterson n.d.).

Social media allows members of the public to seek and share information online during times of crises (Wang 2010). After Hurricane Katrina in 2005, some residents in New Orleans used social media to try

and locate neighbours and friends (Qu, Wu & Wang, 2009). In 2007, during the Southern California wildfires, the fires were so spread out across the area that obtaining information about threatened neighbourhoods and locations from traditional media sources proved difficult (Hughes, Palen & Peterson n.d.). Instead some communities in mountainous areas used social media to share information relevant to their area (Shklovski, Palen & Sutton 2008). In a sense, these communities were able to project their geographical activities into the digital domain (Hughes, Palen & Peterson n.d.).

Social media could possibly play a part in building community resilience by providing tools for the public to participate in crisis preparedness, response and recovery (Belblidia 2010). This thesis focuses on the use of social media as a tool in response and recovery. After the 2011 Great East Japan earthquake, Hjorth and Kim (2011) found examples in which social media gave the public a way to deal with their emotions and to mourn with their community. Numerous studies from around the world have investigated how residents create common histories of disaster events by sharing photos, personal experiences, and videos through social media platforms (Hughes, Palen & Peterson n.d.). Therefore, in addition to simply gathering information, using social media has allowed people to communicate and interact in a way that is impossible using other media (Semaan & Mark 2011). It also allows victims and emergency response organisations to communicate and interact with one another when traditional media channels fail (Dufty 2012).

2.7 ARE THERE PATTERNS IN HOW PEOPLE USE SOCIAL MEDIA DURING DISASTERS?

There has been lots of interest amongst academics and disaster officials regarding how people communicate via social media, and whether people communicate in patterned ways in times of crisis. Examples of studies on categorising and analysing messages on social media by those affected by disaster include: Bruns et al. (2012), Caragea et al. (2011), Imran et al. (2013, 2014), Kulemeka (2014), Olteanu, Vieweg and Castillo (2015), Poblete et al. (2011), Qu et al (2011b), Qu, Wu and Wang (2009), Starbird & Palen (2011), and Vieweg (2012). Collectively, these studies found that the messages posted online could be classified into certain categories that shaped how people communicated online during times of crisis. Bruns et al. (2012), for example, examined how people used Twitter during the 2011 Southeast Queensland Floods. They studied both public and official Twitter accounts, focusing particularly on the importance of 'hashtags' and how they easily directed people to tweets concerning the flood. A substantially large number of tweets focused on providing situational information (Bruns et al. 2012). They also found that tweets posted after the immediate disaster moved more strongly

towards donations and fundraising efforts and organising volunteers (Bruns et al. 2012). This was also the case in Kulemeka (2014), Olteanu, Vieweg and Castillo (2015), Qu et al. (2011b), and Qu, Wu and Wang (2009).

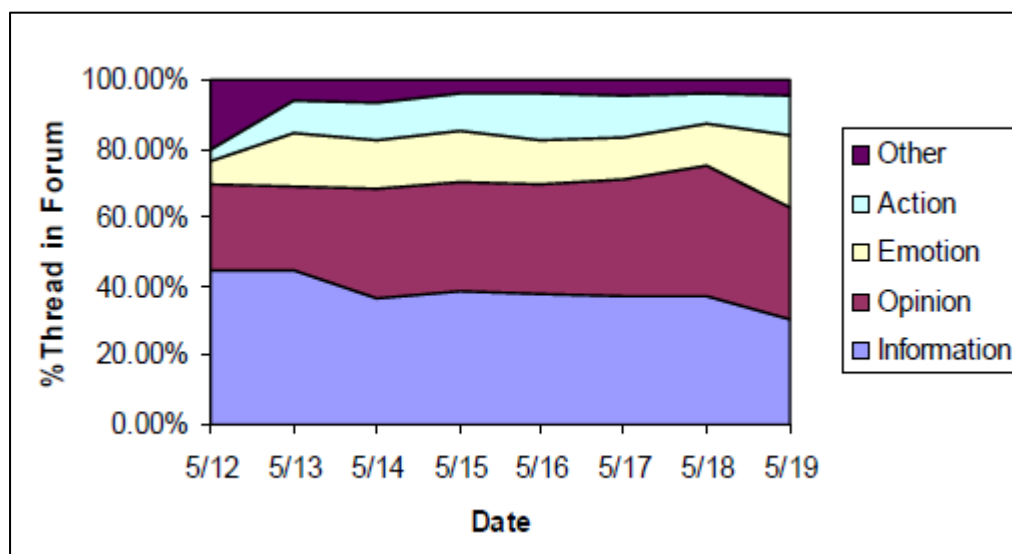
Qu, Wu and Wang (2009) showed that the types of messages people share during disasters can be grouped into distinct categories, which shifted over the course of the disaster. Their research examined how *Tianya* (a social media platform in China) was utilised by members of the public during the 2008 Sichuan earthquake. On *Tianya*, users can discuss various issues that other users can respond to with a statement. The statement as well as the responses is called a 'thread'. Qu, Wu & Wang (2009) went through 4,300 threads that developed within a week of the earthquake. The authors found that those impacted by the earthquake generated distinct categories of thread. Once the categories were recognised, the authors looked at whether these categories would appear in 100 random threads. Thus, they applied the rubric to a larger body of tweets. Once the analysis was complete, the category list was refined to analyse a further 50 threads. Thereafter, Qu, Wu & Wang (2009) established that the categories were definitely representative which prompted them to study 2,266 threads. To summarise, these authors looked at some tweets to determine message categories, tested the tweets on an additional 100 threads, revisited their categories, applied the categories to a larger body of tweets (Qu, Wu & Wang 2009). In total, Qu, Wu & Wang (2009) identified 16 different categories (Table 2.8.1).

Table 2.7.1 Threads created on the Tianya Forum after the 2008 Sichuan earthquake

Type of thread	Explanation
Information sharing	Information provided to forum readers
Information seeking	Question is posed to forum readers
Information gathering and integrating	Information compiled in accessible format for readers
Criticising	Individuals, government, or others criticised
Other opinion	Opinion provided or sought without criticising
General action	Action proposed to the general public
Individual action	Individual declares that action has been or will be taken
Coordinating action	Attempt to organise group action
Expressing emotion	Feelings such as anger expressed
Emotional-support	Emotional support is demonstrated
Sense-making	Attempt to interpret or understand the disaster is made
Moderation	Post about how forum is moderated
Norm-shaping	An attempt to shape forum behaviour
Flaming	Anti-social attack on a person or group
Trolling	Anti-social message taunting readers
Off-topic	Message unrelated to disaster

Source: Qu, Wu & Wang (2009)

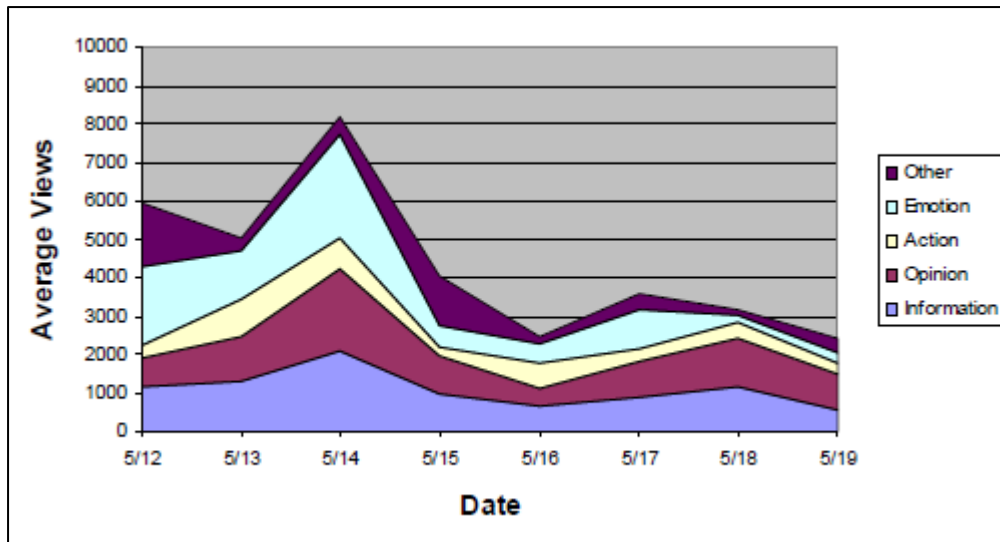
Qu, Wu & Wang's (2009) research showed that 37.3% of threads created in response to the earthquake were information-related, 32.1% opinion-related, 14.2% emotion-related, 10.7% action, and 5.7% were anti-social, moderation-related, and norm-shaping. Figure 2.8.1 shows that the opinion and information-related threads were generated at the start of the disaster whereas majority of the emotion and action-related threads were created at a later stage (Qu, Wu & Wang 2009). The researchers hypothesised that directly following the earthquake, people would be more interested in finding out about what has happened, but as the disaster evolved, people would begin to express emotions, criticise, and call for action (Qu, Wu & Wang 2009).



Source: Qu, Wu & Wang (2009)

Figure 2.7.1 Thread distribution over time on the Tianya Forum as the Sichuan earthquake disaster unfolded

Threads concerned with information gathering and integration were most likely to be read and receive a response by other users (Figure 2.8.2) (Qu, Wu & Wang 2009). Ranked second in replies and views was opinion-related threads, followed by action and then emotion-related threads (Qu, Wu & Wang 2009). The researchers argued that this was because people were more interested in information-related threads than threads where people just expressed their emotions (Qu, Wu & Wang 2009).



Source: Qu, Wu & Wang (2009)

Figure 2.7.2 Average views per thread, by category, on the 2008 Sichuan earthquake

To determine if the findings by Qu, Wu & Wang (2009) were applicable to other contexts, Kulemeka (2014) examined the 2014 Hazelwood mine fire in Victoria, Australia. The fire started on 9 February 2014 and spread into a large coal mine where a multinational company was working. Local towns were placed at risk from toxic fire fumes. People from the towns were directed to stay indoors while vulnerable individuals were evacuated. The fire continued to burn for a few weeks, disturbing residents who then created a Facebook page that they called *Protest: Disaster Latrobe Valley to pressure the government and GDF Suez* (Kulemeka 2014: 53). A protest was organised on the page and more than 1,200 people attended the event (Kulemeka 2014). Kulemeka (2014: 53) drafted five research questions to ascertain whether Qu, Wu & Wang's (2009) study was also relevant to how people used Facebook in response to the Hazelwood mine fire:

1. "One a Facebook page created by people impacted by the 2014 Hazelwood mine fire disaster, were information related, opinion related, action-related, emotion-related, sense-making, community building, and anti-social threads present?"
2. "Were there other threads present that were not identified by Qu, Wu & Wang (2009)?"
3. "What thread(s) was/were most prevalent at the beginning of the disaster?"
4. "What thread(s) was/were most prevalent in the later days of the disaster?"
5. "What thread(s) was/were most prevalent on the page and which was/were the least prevalent?"

On Facebook, the various threads received gave insight into which threads were preferred by users. The popularity of a thread was determined by how many responses are received, how many times a thread was shared, and how many times the *like* icon was clicked. A further three more research questions were developed to evaluate the popularity of certain threads: "Which thread(s) received the most likes?; Which thread(s) was/ were shared the most?; Which thread(s) received the most responses?" (Kulemeka 2014:53). A total of 239 threads were recognised as appropriate for analysis.

A random 20 threads were selected by two independent coders and analysed to determine whether they fitted into categories identified by Qu, Wu & Wang (2009) or if entirely new categories were found.

The coders met to discuss their findings, once initial analysis had occurred, and found that “initial inter-rater agreement was 96%” (Kulemeka 2014: 53). Inconsistencies were fixed, prior to coders studying the remaining 219 threads, and final ratings were decided by consensus. The results are as follows in Tables 2.8.2, 2.8.3, and 2.8.4. The threads could be classified into the same categories identified in Qu, Wu, and Wang (2009). They show a high number of information-related threads. The popularity of information-related threads, which received a high number of comments, is shown in 2.8.4. Threads expressing emotion and coordinating action were also popular as they received the most likes and shares respectively.

Table 2.7.2 Threads identified on Facebook for the 2014 Hazelwood mine fire in Australia

Type	Number
Information sharing	57
Information seeking	19
Information gathering and integrating	2
Criticising	34
Other opinion	7
General action	11
Individual participation	19
Coordination action	21
Expressing emotion	21
Emotional support	16
Sense-making	5
Moderation	20
Norm shaping	5
Flaming	1
Trolling	1
Total threads	239

Source: Kulemeka (2014)

Table 2.3 shows the categories in which Kulemeka (2014) classified the online data for the 2014 Hazelwood mine fire in Australia. Kulemeka (2014) classifies the data into 6 main categories and 13 sub-categories which are referred to as ‘type’. Examples of messages that fit into each category and their type are reflected in the ‘example’ column.

Table 2.7.3 Thread categories and types, for the 2014 Hazelwood mine fire in Australia

Category	Type	Example (Direct quotes)
Information-related	Information sharing	"I have been advised there is a breakfast tomorrow morning at Sunrise Restaurant in Morwell from 7:15 for small businesses. It is going to be a forum whoever would like to attend needs to RSVP"
	Information seeking	"Would someone please advise me with what is happening with the education side of this crisis?"
	Information gathering and integrating	"I spent all day yesterday looking into camps caravan park and cabins and have a list of places that have been offer you do NOT need to be morwell resident nor do u need a hcc and yes we can take our pets you can stay 1 night up to a week choice is urs. feel free to comment or inbox me if u need help"
Opinion-related	Criticising	"The first responsibility of government is to protect its people and that is not happening in Morwell."
	Other opinion	"if anyone says GDF Suez is just a huge multinational company that does not care remind them that it is owned and operated by people who have homes and families. We need to remember that people causes this problem and only people can solve it. We just need to find an effective way to communicate, person to person."
Action-related	General	"can everyone please to aca.ninemsn.com and share their stories about how we are being treated by the gov GDF and epa ect I think it could help a lot if we all did."
	Individual participation	"Today show have called I will be on just after 6am to talk about disaster in the Valley Tuesday Morning."
	Coordinating	"A bunch of people have sent me leaks about what is happening in the Hazelwood mine, in the hospitals and in the communities around the fires – I am writing these leaks up for a new acritical about this disaster – if you are one of these people I need you to message me."
Emotion-related	Expressing	"I'm in Moe and were sick to, its just not in morwell its on a large scale, and they sweeping it under the carter only morwell NO WAY!!!!
Community building	Moderation-related	"come & join this page, we are the same people moving to a permanent page before our event page disappears like last time."
Category	Type	Example
	Norm shaping	"if you think you have put a comment on this page that attacks another member of this page please remove it."
Anti-social	Flaming	"I don't like you I don't trust you and I sure in hell don't believe anything you say."
	Trolling	(Actual trolling comment was removed. Below is the response it elicited). "I suggest threatening to smash woman in the side of the head with a lump of timber isn't a good reflection of you though process."

Source: Kulemeka 2014

Table 2.7.4 User interaction with threads, for the 2014 Hazelwood mine fire in Australia

Type	Number
Most liked thread: emotional support	Liked 49 times
Most shared thread: coordinating action	Shared 12 times
Most commented thread: information seeking	44 comments posted
Average (mean) likes per thread	7 likes
Average (mean) times thread shared	1.8 shares
Average (mean) comments in response to thread	9 Comments

Source: Kulemeka (2014)

Kulemeka (2014) concluded that there are common ways in which people affected by disaster communicated on social media, irrespective of where they live. Those impacted by the earthquake in China and those affected by the mine fire in Australia both used the internet to post similar messages (Kulemeka 2014). Differences were found in the different types of threads posted, with Facebook users being more likely to post more action-related threads than those who used Tianya. It was noted that this result could be due to each social media platform being used in cultural and disaster contexts that differ considerably (Kulemeka 2014). A paper by Qu et al. 2011b titled “Microblogging after a Major Disaster in China: A Case Study of the 2010 Yushu earthquake” found similar results to Qu, Wu and Wang (2009) and Kulemeka (2014) on a site called *Sina-Weibo*.

In this thesis, the research approach by Qu, Wu & Wang (2009) is adopted because it is one of the first studies of its kind and has also been applied by Kulemeka (2014). Since similar methodologies were applied to two separate disasters in different regions (China and Australia), the findings from these studies provide a solid base for comparison with the Garden Route Fires, where a similar methodology was adopted. Thus, results can be compared accurately.

3 METHODOLOGY

The research approach for this thesis draws on the studies by Qu, Wu & Wang (2009), Qu et al. (2011b) and Kulemeka (2014). As in the Kulemeka (2014) case study, this research focused on Facebook. This research sought to determine whether the findings obtained by Qu, Wu & Wang (2009), Qu et al. (2011b) and Kulemeka (2014) are applicable in the South African context. The research comprised two primary components: a review of the literature and the extraction, categorisation, and analysis of messages posted on *Knysna Fires 7th June 2017*, an open public Facebook group created in response to the fires.

3.1 SAMPLING AND APPROACH

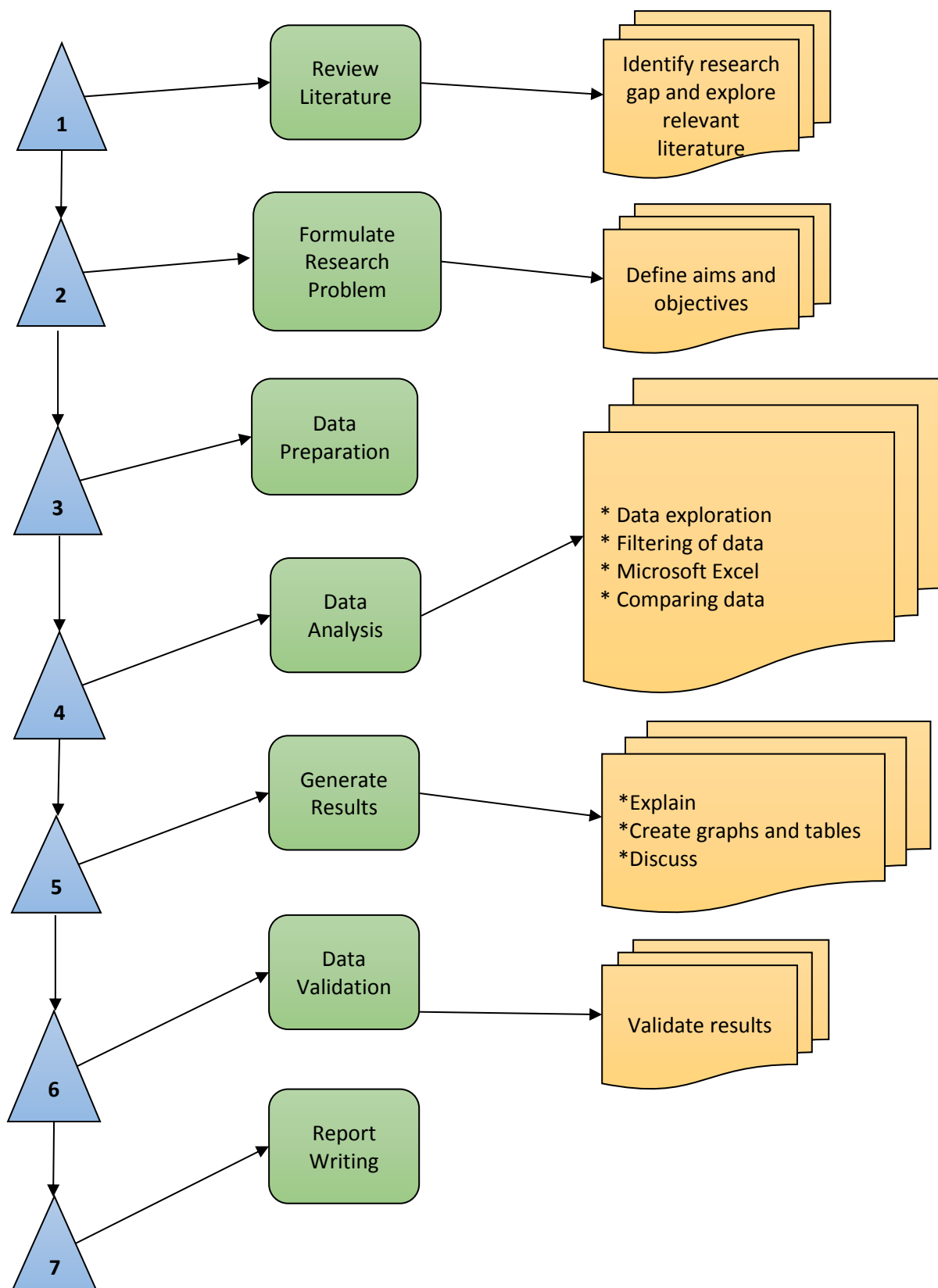
The *Knysna Fires 7th June 2017* group was created anonymously by members of the public at the onset of the fires. The group was chosen due to it being open and accessible and because of its popularity. At the time of writing, the group had received 49,080 likes and 52,105 follows which is substantially more than any other group specifically created in connection with the Garden Route fires.

The data-set was split up into two: the disaster occurrence and response phase (Phase 1); and the recovery and rehabilitation phase (Phase 2). Phase 1 consists of Facebook messages that were posted from the start of the fires to when the primary fires were extinguished: 7 to 11 June 2017. Phase 2 consists of Facebook messages that were posted up to one month following the 'end' of the disaster occurrence: from 12 June to 12 July 2017. There were 3,668 messages posted during Phase 1 and 2,551 messages posted during Phase 2, which were counted manually.

A Creative Research Systems (2012) online sample size calculator was used to identify an appropriate number of messages to analyse. A confidence level of 95% was used with a 5% margin of error. The sample size calculator indicated that 348 Facebook messages should be examined in Phase 1 and 334 Facebook messages in Phase 2. This meant that roughly every 10th message was extracted and examined. Because Facebook now allows the public to comment and react to other comments within original Facebook threads, each message was looked at individually as opposed to the thread overall. Another reason why messages were looked at individually is because although the *Knysna Fires 7th June 2017* group is an open one, the main threads were posted by administration members. A Facebook thread is comprised of a starting message that is posted by an administrator of the group and visitors' responses to it. The analysis includes both the starting messages as well as the responses. Non-administration users could not start threads; the only way a thread could be started by other users was if the group's administrator posted their message for them.

The messages were classified into categories adapted from those used by Qu, Wu & Wang (2009), Qu et al. (2011b), and Kulemeka (2014) in their respective studies. Although, instead of developing an algorithm to sort through and classify the messages, the messages were extracted and classified manually. Each message was examined individually and once a category had been selected for that message, it was extracted into Microsoft Excel and placed into the spreadsheet that was appropriate for its category. The Facebook messages were further analysed and sorted into photo messages, videos, and text messages to determine which format of social media message is the most popular, and would thus possibly be the most effective and useful to authorities and other members of the public when communicating during times of disaster. All mathematical results were calculated using Microsoft Excel and are displayed in the form of tables and graphs.

3.2 RESEARCH DESIGN AND PROCESS



3.3 ETHICAL CONSIDERATIONS

Before starting with data analyses, ethical clearance was sought and received. Even though the required data was collected from an open Facebook group, there were ethical concerns because private information is attached to people's Facebook messages; this personal information can be accessed by simply clicking on the persons profile. Although each message was extracted as is, no personal data is represented or reflected in this thesis.

3.4 LIMITATIONS

Several limitations were experienced in this study:

- Time constraints to finish this thesis by 1 November 2018; had there been more time to complete this thesis, a more in-depth study could have been achieved.
- Ethical clearance delays. This thesis changed angles a few times and thus ethical clearance had to be sought each time.
- In terms of literature, there were several articles that would have been good to access. However, many of them needed to be paid for and due to a limited student budget, this was not possible. Attempts to contact some of the authors were made, but no responses were received.
- Even though Facebook is one of the largest social media platforms where online discussions occur, the above findings might not be true for other online social media platforms.
- Because this study took place several months after the disaster, some Facebook messages may have been deleted before the data was analysed which could have reduced the accuracy of the results.

4 RESULTS

4.1 PHASE 1: FACEBOOK MESSAGES POSTED BETWEEN 7-11 JUNE 2017

4.1.1 MESSAGE CATEGORIES IDENTIFIED ON FACEBOOK

Table 4.1.1 shows the different categories that Facebook messages were placed into and provides a description and example of each category. This table was adapted from Qu, Wu & Wang (2009) and Kulemeka (2014).

Table 4.1.1 Classification of messages posted on the Knysna Fires 7th June 2017 Facebook page

CATEGORY	DESCRIPTION	EXAMPLE OF MESSAGES (DIRECT QUOTES)
Information-related		
Information Seeking	Asking for information from other group members	"Any news on how the fires ask started yet?"
Information Sharing	Providing the group with information	"*Attention all Sedgefielders*: _ Please do not panic!_. Pack your clothing. Essentials & some food and have your pets read in case of an imminent threat to Sedgefield. Rather be prepared for the worst than caught off guard. The fire is approximately 5 kilometres out of Sedgefield on the Karatara turnoff side and approximately 10 kilometres on the Ganzvlei side. There are many fire fighters battling the blazes and helicopters will be brought in at first light. The situation is being monitored closely by the fire department, SAPS and ourselves. We will keep you updated."
Action-related		
Individual Participation	Announcing action to be done by an individual rather than an organisation or group of people	"Someone asked for a wheelchair. I have 2 to donate."
Coordinating Action	Action organised amongst group members	"URGENT: WE NEED 5 VOLUNEER FIRE FIGHTERS TO GO AND ASSIST WITH THE FIRES IN GEORGE. PLEASE IF SOMEONE CAN ASSIST US WE WOULD GLADLY APPRECIATE IT. LEAVING +- AT 8AM 11 JUNE 2017 FROM MARGATE AIRPORT VOLUNTEER QUALIFIED FIRE FIGHTERS SHOULD SMS NAME, SURNAME, CONTACT NUMBER QUALIFICTION AND EQUIPMENT DETAIL..." (Name and contact details removed for privacy)

CATEGORY	DESCRIPTION	EXAMPLE OF MESSAGES (DIRECT QUOTES)
General Action	Proposing and advising actions to group members	"If anyone in Knysna affected by the fire is needing internet, we have internet @ iTFuture and you may come and use our internet for free..."
Emotion-related		
Emotional Support	Showing emotional or social support: comforting, blessings, expressing concern for and encouraging victims, and mourning	"What a beautiful kind gesture. Still praying and thinking of all the loss. Bless every single one of you guys"
Expressing Emotion	Voicing personal feelings: sadness, happiness, anxiety, anger, thankfulness etc.	"This is devastating"
Criticising	Criticising administration members of the group, the government, individuals, or organisations	"Absolutely terrible to see, but not a single photo of the affected dwellings in the informal settlements- apparently 200 houses lost there as well, with no insurance and money of the people there must have lost not only their possessions but their work and livelihoods as well. Are these people not part of the Knysna community?? The omission I find shocking too!".
Flaming & Trolling	Insulting or using foul language towards an organisation or group member and posting off-topic and irrelevant messages to entice an emotional response from group members	"The writer of this article is an idiot." You are an idiot. HeraldLIVE, you are insensitive idiots...."
Other/ Off-topic	Irrelevant messages that do not concern the wildfires	"Under £9000 British pounds per year."

The number of Facebook messages per classification is shown in Table 4.1.2. With 124 messages, sharing information messages were the most prevalent with trolling and flaming and criticising being the least prevalent type of messages. This is consistent with both Qu, Wu and Wang's (2009) and Kulemeke's (2014) study despite having looked at each message individually rather than each thread as a whole. During Phase 1, a large number of the messages posted on the group were those providing evacuation notices, and information on where the fire had spread to and in which direction it was moving. Also popular during Phase 1, although not immediately, was information on distribution centres where affected people could receive free water, food, and clothing as well as information on places and accounts to where donations could be sent.

Table 4.1.2 Messages identified on Facebook

Classification	Number	Percentage
Expressing emotion	36	10
Emotional support	12	3
Seeking information	96	28
Sharing information	124	36
Individual participation	17	5
Coordinating action	37	11
General action	14	4
Flaming/Trolling	3	1
Criticising	3	1
Other opinion/Off-topic	6	2
Total threads	348	100

The messages were further classified into four main categories, as shown in Table 4.1.3. The results show that information-related messages were posted the most, followed by action-related messages, emotion-related threads, and lastly, opinion-related threads. It is possible that emotion-related posts, particularly emotional support messages, were posted less often and received fewer responses because even though users voiced their support for the fire victims, the content of those messages were very similar (e.g., blessings, condolences, encouragement) and other group participants did not gain value from them.

Table 4.1.3 Number of messages identified per category

Category	Number	Percentage
Information-related	220	63
Action-related	68	20
Emotion-related	48	14
Opinion-related	12	3
Total	348	100

Table 4.1.4 is consistent with the above information in that information-related messages were the most popular. They were also therefore the most commented on, reacted to, and shared type of message.

Table 4.1.4 User interaction with messages

Description	Number
Most commented message: Sharing Information	169 Comments
Most reacted to message: Sharing information	1600 Likes
Most shared message: Sharing information	1400 Shares
Average times a message was shared	13
Average comments in response to a message	4
Average reactions per message	20

4.1.2 MESSAGE FORMAT

While gathering data, each message was sorted into five different types of message formats (Table 4.1.5). Photo with text and video with text refer to a photo or video that is accompanied by a description of what that photo or video depicts; this text with these photos/videos refers to text captured separately from the text within the photo or video itself. Photo and video messages are a way to graphically portray information on the ground to the public and responders, and this medium usually gives context that is not communicated easily via text only (White 2011; DHS 2012). The popularity of a Facebook format can be determined based on the number of shares, comments, and reactions. As mentioned previously, reactions here refers to Facebook's function where users can react to a post using one of six options: Like, Love, Haha, Wow, Sad, and Angry. Therefore, a Facebook reaction refers to any of these six options.

Table 4.1.5 Number of responses and messages per message format

Format of message	Number of Responses per Format	Number of Messages per Format
Photo only	7475	19
Text only	10032	294
Photo with text	3939	27
Video with text	58	2
Video only	2672	6
Total	24176	348

Although Facebook users may have seen messages and chosen not to respond to them, this cannot be measured and thus the popularity of a message was based on the number of responses it received. Table 4.1.5 captures the number of responses (i.e., reactions, comments, and shares) and the number of messages per message format. At first glance, text only seems to be the most popular type of format

that provoked the most responses. This suggests that both the public and emergency managers and officials should use text-based messages to get their message across and capture the attention of others. However, one needs to be cautious when making this assumption, as the findings reflect that text only messages were simply far more numerous than other message formats. For this reason, the number of responses per message, percentage number of messages per format, as well as the percentage response per message was calculated. In doing so the popularity of each message format could be calculated relative to one another (Table 4.1.6 and Figure 4.1.1).

Table 4.1.6 Comparative analysis of responses

Format	No. of messages	No. of responses per message	% no. of messages	% response per message
Photo only	19	394	5	38
Text only	293	35	84	3
Photo with text	27	146	8	14
Video with text	2	29	1	3
Video only	6	446	2	42
Total	347	1050	100	100

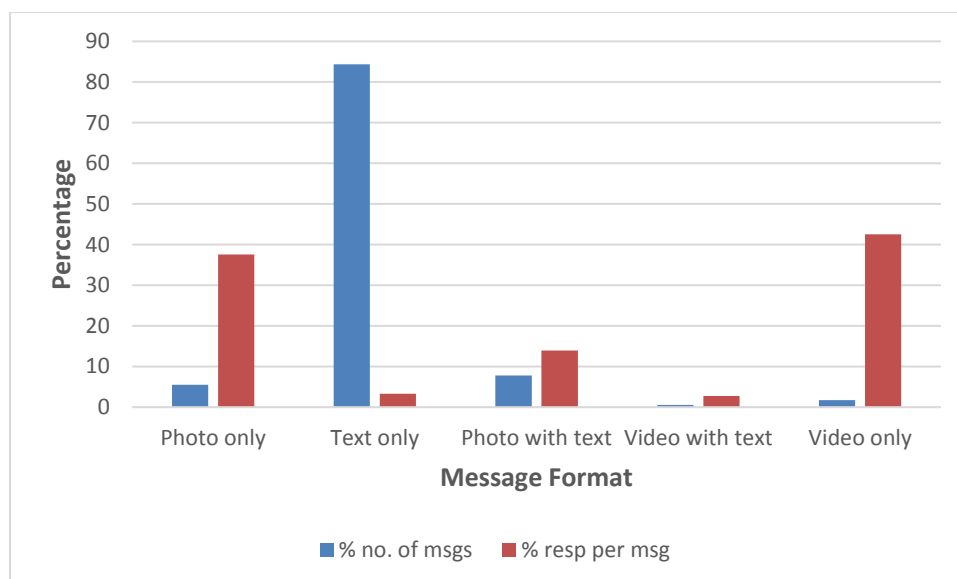


Figure 4.1.1 The relationship between the percentage of messages per format and their responses

Table 4.1.6 and Figure 4.1.1 indicate the relationship between how often a particular format of message was posted versus how many responses that particular type of format received. Table 4.1.6 shows that although 84% of the messages posted were text only, text only messages only received a 3% response rate. On the other hand, while only 2% of the messages were videos only, the response rate was a high 42%. From this, we can assume that if more people posted videos online, the number

of responses would have increased. Following video only messages was photo messages, the format that received the highest responses was photo only messages, and photos with text; video with text and text only messages received the lowest percentage of responses. Photos and videos without text 'force' the reader to actually look at the photo or video to find out more information rather than just glancing over it. However, from these results it is evident that for the officials and the public to reach other members of the public, photo and video should be used to reach a wider audience instead of only text. Photos and videos are also more emotive and evoke more of an emotional response in people.

4.2 PHASE 2: MESSAGES POSTED BETWEEN 12 JUNE 2017 TO 12 JULY 2017

4.2.1 MESSAGE CATEGORIES IDENTIFIED ON FACEBOOK

The number of Facebook messages that were posted up to one month following the Garden Route fires, per classification, is shown in Table 4.2.1. With 118 messages, sharing information messages were the most prevalent, with trolling and flaming, and other opinion/off-topic messages being the least common. This is again mostly consistent with findings by Qu, Wu, and Wang (2009) and Kulemeka (2014). The difference between those studies and these findings is that the number of messages categorised as criticism on the *Knysna Fires 7th June 2017* Facebook group was substantially less. Information-related messages were the most prevalent, followed by emotion-related, action-related and lastly opinion-related threads as the least prevalent (Table 4.2.2). The number of emotion-related posts increased from 48 messages to 90 messages. The emotion-related messages were largely posted in response to photos and video's shared of the aftermath and devastation of the fire. When the results in Table 4.2.3 are compared to table 4.1.4 above, it is evident that post disaster, sharing information is still the type of message that receives the most comments and reactions. However, the most shared message is now about coordinating action, and the average reaction per message has also doubled.

Table 4.2.1 Messages identified on Facebook

Classification	Number	Percentage
Expressing emotion	56	17
Emotional support	34	10
Seeking information	66	20
Sharing information	118	35
Individual participation	8	2
Coordinating action	17	5
General Action	24	7
Flaming/Trolling	2	1
Criticising	6	2
Other Opinion/Off-topic	3	1
Total threads	334	100

Table 4.2.2 Number of messages identified per category

Category	Number	Percentage
Information-related	184	55
Action-related	49	15
Emotion-related	90	27
Opinion-related	11	3
Total	334	100

Table 4.2.3 User interaction with Messages

Description	Number
Most commented on message: Sharing information	182
Most reacted to message Sharing information	3600
Most shared message: Coordinating action	670
Average times a message was shared	13
Average comments in response to a message	3
Average reactions per message	43

In Phase 2, once the primary fires had been extinguished, majority of the information shared consisted of videos and photos of the devastation, lost and found animals, and links to articles offering explanations to what had happened and how. Out of a collective 162 information-seeking messages, more than 48% were answered with a comment, while majority of the others were at least responded to with a reaction or a share. It also seems that users' information seeking needs were fulfilled, because information-related messages were also the most popular.

4.2.1.1 INFORMATION-RELATED MESSAGES

A few of the information-related messages were thought to display incorrect information or information that was not relevant at the time of posting. This sparked opinion-related messages that criticised the incorrect information. Judging the credibility of information proved very important so as not to distribute fake information. Many users seemed to read a message without seeking information elsewhere on its credibility, and in turn passed this fake information on to other members of the community. In some cases, even after the information was verified as incorrect, users continued to post responses to the incorrect information. Although the administrators of the group had communication with the municipality and fire organisations and tried to verify information through them, there is still a lack of effective procedures to verify the credibility of the shared information. Qu et al. (2011a) noted that this could lead to the quick spread of rumours as well as cause the public to doubt and question the authenticity of the information within the group.

4.2.1.2 ACTION-RELATED MESSAGES

In Phase 2, once the initial panic of the fire had diminished and people could gather their thoughts and make use of information received during Phase 1, posts regarding distribution centres and donations were still popular. However, the types of donations requested altered to fit the needs of the community better. For example, in Phase 1, general requests for water, food, and clothing were made, while in Phase 2 clothing for certain age groups was specified, as well as types of food. People rallied together to assist the community, to the extent that nearing a month after the disaster, the public were asked to stop donating clothes. They were asked to rather donate or lend other needed items (e.g., Lucerne for wild animals, and thermal goggles and four-wheelers to help locate missing horses and ponies), or to donate the clothes to other areas/families in need that were not necessarily affected by the fire. Phase 2 also saw regular updates on the distribution of donations and the amount of donations received.

It must be noted that although most donations received were from South Africans, several donations were received from all over the world. Many questions were asked in relation to donations, however once progress reports were posted regarding the donations, the number of questions about donations began to diminish. By providing reports on where the donations were going, how they were being distributed and to who, and providing a summary of the monetary donations, people placed more trust in the organisations who oversaw the donations. However, not limited to donations, other action-related posts helped people get into contact with those affected by the fire, helped locate missing animals, and helped with accommodating those who had lost their homes.

4.2.1.3 EMOTION-RELATED MESSAGES

Several more emotion-related messages were posted and responded to in Phase 2. Emotion-related messages gained more response when photos or videos were posted of the devastation of the fire. Thus, graphically portrayed messages sparked more emotion-related responses compared to text messages. Collectively, 41% of messages were emotion-related. These opinions influenced other users' opinions as well as the group as a whole. Frequent emotion-related posts were "God Bless you", "God Bless Knysna", "Praying for you all", "This is heart breaking", and "So sad". Majority of the messages posted were blessings, encouragement, mourning, and thankfulness.

4.2.1.4 OPINION-RELATED MESSAGES

Facebook is a platform where members can express and exchange their opinions. Collectively, opinion-related posts only accounted for 6% of messages. This is substantially less than that experienced in Qu, Wu and Wang's (2009) study. Most of the messages criticised individuals, the government, news reporters, and the group itself on matters relating to false information, the cause of the fire, and not broadcasting enough on the effect of the fire on informal settlements. There was very poor coverage of the devastation in informal settlements, which sparked criticism towards the *Knysna Fires 7th June 2017* Facebook group.

The administrators of the group explained that they could only post messages on information that they received and that they had received very little information on the informal settlements. Although messages were being relayed from the municipality and other officials, majority of the messages were from the general public. This poses the question of whether officials simply did not focus on those areas, and thus there was limited coverage, or whether people living in informal settlements did not make much use of Facebook groups during the disaster. Even though both opinion- and emotion-related messages may not come across as directly beneficial in disaster response, it is important that these social interactions occur so that social norms and mass opinions can be formed. It is also necessary for emotional support and comfort, and the mental stability of people affected by the disaster.

4.2.2 MESSAGE FORMAT

While gathering data, each message was sorted into the same five format types that were used in Phase 1. Table 4.2.4 captures the number of responses (i.e., reactions, comments, and shares) and the number of messages per message format. The results are consistent with those found in Phase 1, with text only messages seeming to be the most popular type of format that provoked the most responses.

However, once again, this is not necessarily true as although photo with text messages received the highest number of responses, the number of messages under this category is significantly greater than any other message format; therefore it cannot be compared accurately due to the difference in the number of messages per message format.

Table 4.2.4 Number of responses and messages per message format

Format of message	Number of Responses	Number of Messages
Photo only	5	2
Text only	11691	229
Photo with text	16335	89
Video with text	1928	12
Video only	52	2
Total	30011	334

When the results were calculated as a proportion of message frequency, a different picture emerges. Table 4.2.5 and Figure 4.2.1 indicate the relationship between how often a particular format of message is posted versus how many responses that particular format of message receives. Although 69% of the messages posted were text only, text only messages only received a 12% response rate. While only 27% of the messages were photo with text, the response rate was much a much higher 43%. From these results, it can be assumed that if more people posted photos and videos online, the number of responses would have increased. Video with text messages received the next highest number of responses, with video only and then photo only receiving the lowest percentage of responses.

Table 4.2.5 Comparative analysis of responses

Format	No. of messages	No. of responses per message	% no. of messages	% response per message
Photo only	2	3	1	1
Text only	229	52	69	12
Photo with Text	89	184	27	43
Video with Text	12	161	4	38
Video only	2	26	1	6
Total	334	426	100	100

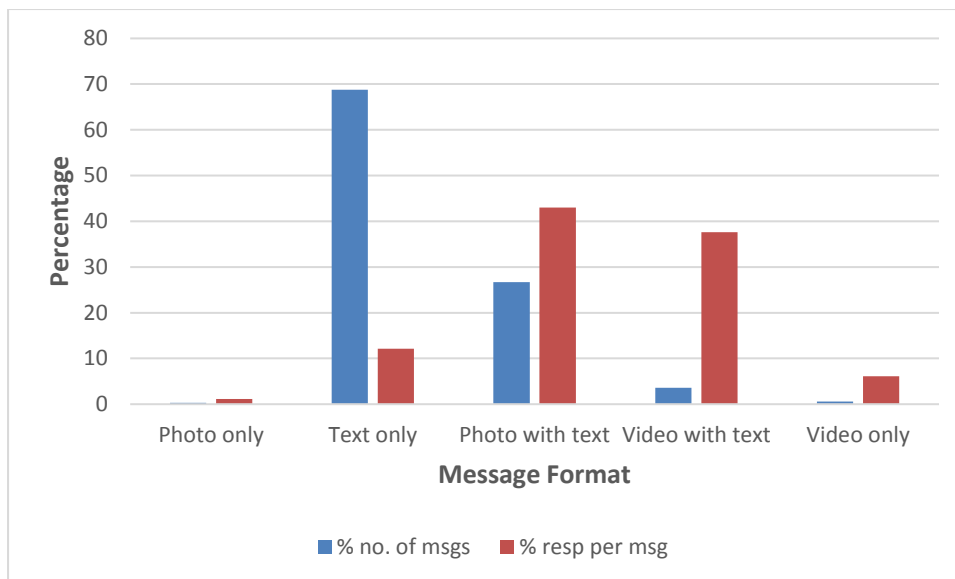


Figure 4.2.1 The relationship between the percentage of messages per format and their responses

These results differ from those found in Phase 1 where videos and photos without text were more popular than messages with text only. However, when looking into each response, it was found that the reason why these types of formats appeared more popular was because users had more questions about the photos and videos that lacked a text explanation. Several users complained about photos and videos being posted without explanations because it sometimes led to confusion and several questions being asked about that message. It is assumed that due to these complaints during the event, post event photo and video messages came with more text attached to offer an explanation and avoid confusion. From these results, it is evident that for the officials and the public to reach other members of the public, photo with text, and video with text messages should be used to reach a wider audience, as opposed to messages containing only text, photos, or videos.

Figure 4.2.2 shows the percentage comparison between the number of messages per message format for Phase 1 and Phase 2. Figure 4.2.3 shows the percentage change between the number of messages per message format from Phase 1 to Phase 2. The greatest percentage change between the number of messages per message format from Phase 1 to Phase 2 was seen in photo with text messages, with a 19% increase from Phase 1 to Phase 2. The greatest decrease from Phase 1 to Phase 2 was found with text only messages, which dropped by 16%. The smallest difference occurred in video only messages which dropped by 1% from Phase 1 to Phase 2. It is possible that Facebook users noted the high response rate from photo with text, video only, and photo only messages and acted accordingly.

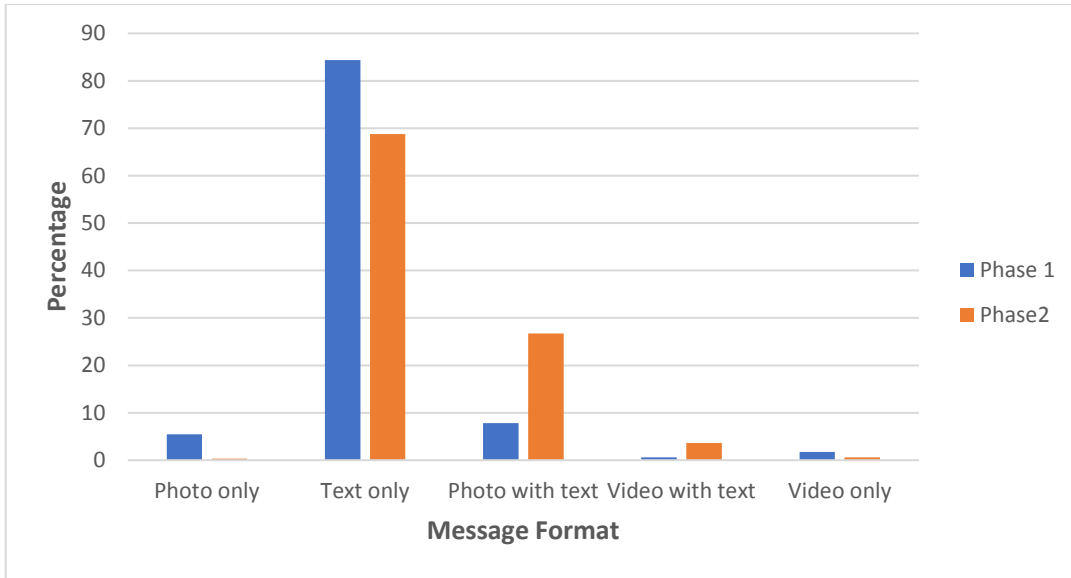


Figure 4.2.2 Percentage comparison between the number of messages posted per message format

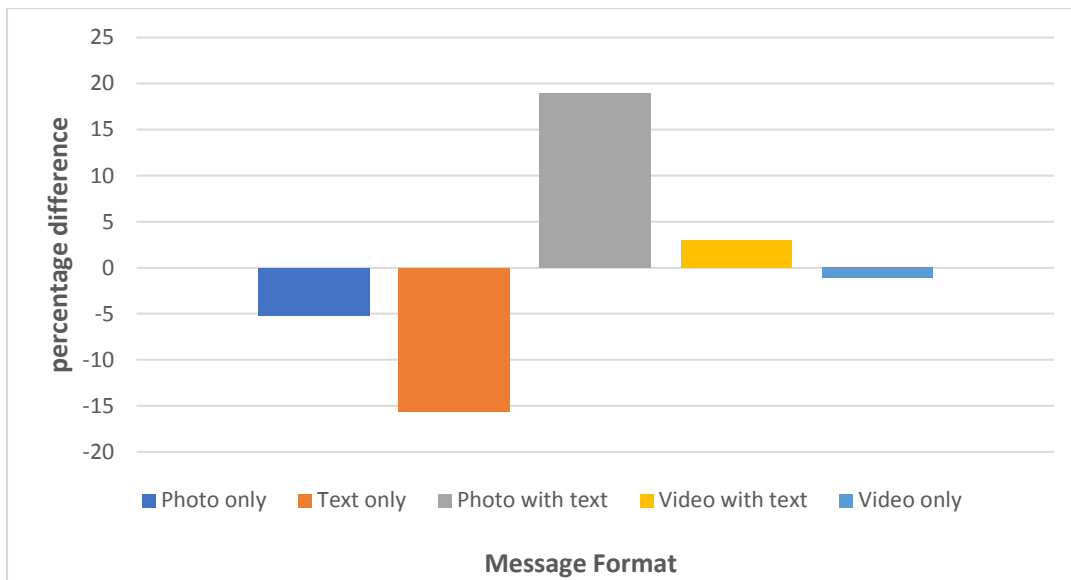


Figure 4.2.3 Percentage change between the number of messages posted per message format

Table 4.12 simply shows all results from Phase 1 and Phase 2 in a comparative table and reflects what has been mentioned above. The raw data has been eliminated and all percentages regarding messages and responses are displayed for easy viewing.

Table 4.2.6 Comparative table of Phase 1 and Phase 2 results

	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Format	% no. of messages	% no. of messages	% response per message	% response per message	No. of responses per message	No. of responses per message
Photo only	5	1	38	1	394	3
Text only	84	69	3	12	35	52
Photo with text	8	27	14	43	146	184
Video with text	1	4	3	38	29	161
Video only	2	1	42	6	446	26
Total	100	100	100	100		

4.3 HOW THE AUTHORITIES USED FACEBOOK

The number of messages posted onto the *Knysna Fires 7th June 2017* group by officials was not extracted and examined into a category specifically for messages from authoritative sources. However, it was clear from the examined messages that officials were aware of the Facebook group and did make use of it. Administrators often posted messages indicating that they had received a specific message from the municipality. When looking at the *Knysna Municipality* Facebook page, references to the *Knysna Fires 7th June 2017* Facebook page could also be found. Two Facebook pages directly involved in managing the disaster, which were active within the *Knysna Fires 7th June 2017* group, were the *Knysna Municipality* and the *Southern Cape Fire Protection Association* pages. Because these two Facebook pages were active within the *Knysna Fires 7th June 2017* group, it is assumed that they would have made use of the information provided by the group. There were also several web pages that appeared within the *Knysna Fires 7th June 2017* group, such as the *Knysna-Plett Herald* and *News24*. Administration members posted links to the Facebook news pages and web pages, as well as articles written by these news outlets; however, it is unknown whether staff from these news sites were in direct contact with and/or made use of the group.

4.4 SITUATIONAL AWARENESS

According to Qu et al. (2011b: 29), situation updates “may improve situational awareness for both the general public and decision makers”. Situation update messages were received from both primary sources (i.e., messages received directly from the public, rescuers on the ground, and news reports)

and secondary sources (i.e., messages passed on from primary sources). Messages posted by both the group's administrators and users within the group were largely from secondary sources.

The *Knysna Fires 7th June 2017* Facebook group raised significant situational awareness, receiving 49,080 likes and 5,105 follows and reaching people all over the world. The map shown in Figure 4.4.1, highlights in yellow all the countries that received information from the group. This image was developed by the administrators, using information from users' messages and their profiles. Several people commented on the post containing the map, asking the administrators of the group to add their country to the map as they too were receiving information from the group. There were numerous people from around the world who made use of the Facebook group, and who mentioned having friends and/or family members who were either directly affected by the fires or resided in these areas. These people used the group to either seek friends and/or family members, find out how they could help, and to keep up with what was happening on the ground. Several of the messages within the group contained the hashtags *#KnysnaFire* and *#KnysnaRises*. These hashtags can be searched in the general Facebook search bar where people who are not in the group could then be directed to the group. The messages within this group could therefore reach a much larger audience than the group itself.



Source: *Knysna Fires 7th June 2017*

Figure 4.4.1 Countries where the information on the *Knysna Fires 7th June 2017* page reached

5 DISCUSSION

During the 2017 Garden Route fires, Facebook became a platform for sharing information, bearing witness to the disaster and giving insight into what was happening. The same can be said for the 2011 Japanese earthquake and tsunami (Acar & Muraki 2011), 2011 Queensland floods (Bruns & Burgess, 2014), 2011 Christchurch earthquakes (Bruns & Burgess, 2014), 2014 Hazelwood Mine fire (Kulemeka 2014), 2015 Nepalese earthquake (Noubel 2015), 2013 Little India Riot (Pang & Ng 2015), and the 2013 Boston Marathon bombings (Holman, Garfin, & Silver 2014). The analysis showed that people affected by the Garden Route fires were most likely to use the *Knysna Fires 7th June 2017* Facebook group to share or obtain information and update one another with what was happening. Qu et al. (2011b) found that during a disaster, situation updates are extremely important and of high value. Information-related messages accounted for more than half of the messages in both Phase 1 and Phase 2. These results mirror what is found in the literature and similar studies. As noted by Landwehr and Carley (2014), disaster-affected people use social media to make contact with local community members for understanding, aid, and support. Wang (2010) also noted that social media allows members of the public to seek and share information online during times of crisis.

The different messages posted in the *Knysna Fires 7th June 2017* Facebook group were sorted into four main categories: information-related, action-related, emotion-related, and opinion-related behaviours. Numerous studies from around the world investigated how residents create common histories of disaster events by sharing photos, personal experiences, and videos through social media platforms (Hughes, Palen & Peterson n.d.). Therefore, in addition to simply gathering information, using social media has allowed people to communicate and interact in a way that is impossible using other media (Semaan & Mark 2011). This is evident in that messages could be classified into the above-mentioned four categories and were not limited to simply gathering information. The online social media site proved to be an effective channel of communication throughout the disaster; this site continues to be, with the page still receiving messages at the time of writing, over a year after the event.

From the messages posted it is clear that the administrators of the group had ongoing communication with the municipality and fire organisations. Thus, the page indirectly helped the public communicate to authorities and the authorities also sent messages, which the administrators of the group shared- so indirectly there was communication that way too. The page was also visible to authorities and therefore the information posted on the group could also be seen and used by the authorities too. Information that was shared on the group was from both the public and from disaster management

officials. Although the information posted was usually received from elsewhere, it was enhanced by additional information and supplementary discussions. For example, the information within a message could have been received by word of mouth or another social media site, but once posted on the group, it would spark discussion and possible new information on the topic.

During disasters, damage assessment is crucial (Giacobe & Soule 2014). It is important that emergency managers know where there is damage, particularly in large-scale disasters (Giacobe & Soule 2014). Messages were posted onto the Facebook group with links to municipal and insurance pages where people could register their lost home and belongings and thus give authorities a better idea of what and how much had been damaged and/or lost. Giacobe & Soule 2014 note that crowdsourcing is a good way to assess damage following very large disasters. This is done by viewing and synthesising photographs that have been taken by the public and shared on social media. There was a large portion of photos and videos showing the devastation of the fire, and although this was classified into the information-related category, it was not limited to this category as officials and other group members could make use of this information to take action. Meier (2015) notes that content gathered from various social media platforms is now also being included into the overall management of events by some emergency management institutions. Although not explored and examined in any detail, there was evidence of the Knysna Municipality and Southern Cape Fire Protection Association making use of the information provided within the *Knysna Fires 7th June 2017* Facebook group.

The public is most often interested in being helpful during emergency circumstances, and they are often the first responders on the ground (Fraustino, Liu & Jin 2012). Social media could possibly play a part in building community resilience by providing tools for the public to participate in crisis preparedness, response and recovery (Belblidia 2010). Community resiliency and the ability to withstand and rebound from emergencies are improved by individuals who can solve problems at the lowest level possible. Social media can help engage and empower individuals from all layers of society to address response and recovery needs, sometimes even without government involvement (Acar & Muraki 2011). This was evident in the findings from the *Knysna Fires 7th June 2017* Facebook group.

Several action-related messages were posted and responded to during both Phase 1 and Phase 2 and were typically associated with rescue and relief efforts. The effectiveness of Facebook in emergency response and relief is shown in its capacity to implore donations (Qu et al. 2011b). Majority of the action-related messages were message requests for donations, the transport of these donations, and the location of the various distribution centres. These messages listed several donation networks and

provided comprehensive information for the donation of both physical and monetary goods. These messages attempted to coordinate relief actions amongst those within the group. Action-related messages are important as they often solicit direct actions in disaster response and relief (Qu et al. 2011b). Action-related messages in the first two days of the disaster were not as frequent as those posted after that. This is explained by Qu et al. (2011b: 33), who note that “people need to gain sufficient understanding of the situation before they are able to organize or participate in any actions”.

Videos can be used to enhance disaster response capacities (White 2011). Photo, video, and other streaming visuals also provide useful information for response and recovery efforts (White 2011). Photos and videos are useful for distributing preparedness information, usually giving context that is not communicated easily via text only (DHS 2012). Photo and video messages that were accompanied by a text description to give context to the photos or videos were the most popular message format and thus received the most responses from Facebook users within the *Knysna Fires 7th June 2017* Facebook group. Once a disaster strikes, social media often becomes a platform for expressing emotion and receiving comfort from those experiencing the same emotions (Qu et al. 2011a). Bazarova et al. (2015: 154) state that “people often share emotions with others in order to manage their emotional experiences”. High numbers of emotion-related messages were found in response to messages with a visual component.

The messages posted on the group could be categorised into the same basic categories as those in the 2008 Sichuan earthquake in China, the 2010 Yushu earthquake in China, and the 2014 Hazelwood Mine fire in Australia, with similar findings emerging in relation to the 2017 Garden Route fires in South Africa. Thus, regardless of disaster type or geographical and cultural characteristics, the findings indicate that there are distinct patterns and ways in which people affected by disaster use social media.

6 CONCLUSION

Communication in the modern world has been re-defined by social media (Haddow & Haddow, 2014). Social networking platforms and the internet have provided a place where communicating with as many people is possible anywhere in the world (Dufty 2014). In times of disaster, social media is an easy, effective, and efficient way to communicate and receive information (Dufty 2014). There has been very little research on the use of social media during disasters in South Africa. A few papers made mention of Africa as a whole, but not specifically relating the information to South Africa. Majority of the information found on social media where papers have been written relevant to South Africa have not focused on areas along the Garden Route or focused on analysing various messages that have been sent via social media. Given the increasingly important information role that social media can play during disasters, it is essential to understand how social media is used during disasters and what remains to be tested (Nyondo 2006).

The findings on how Facebook was used during the 2017 Garden Route fires reflect research elsewhere and suggest that people send and respond to messages during disasters in similar ways. Facebook proved to be an effective channel of communication throughout the disaster and continues to be with the page still receiving messages relating to what occurred. Results showed that messages posted on the *Knysna Fires 7th June 2017* Facebook page could be classified into four main categories: Information-related, action-related, emotion-related, and opinion-related. These are the same four categories that were used to analyse social media use during the 2008 Sichuan earthquake, the 2010 Yushu earthquake, and the 2014 Hazelwood Mine fire. Thus, regardless of disaster type or demographics, there are common things that disaster-affected people do and say on social media. Photo and video messages that were accompanied by a text description to give context to the photos or videos were the most popular message format and thus received the most responses from Facebook users. Therefore, photos and videos helped to graphically show the extent of damages in areas affected by the fire.

The conclusions regarding how people affected by disaster use social media suggest several recommendations for both disaster management officials and the public. These recommendations should improve the way in which disaster management officials and the public view and think about disaster-related information on social media, and their subsequent actions.

7 RECOMMENDATIONS

Emergency managers, members of the public seeking additional information, and those impacted by disasters increasingly use social media to communicate (Dufty 2014). Social media has already been a critical and largely positive tool in recent disasters (Antoniou & Ciaramicoli n.d; Acar & Muraki 2011; Bruns & Burgess 2014; Bruns & Burgess 2014; Antoniou & Ciaramicoli n.d; Montgomery 2013; Noubel 2015; Holman, Garfin, & Silver 2014). However, there is great potential for social media to serve as an enhanced and more useful information tool than previously thought. This can theoretically be partially done by efficiently and effectively incorporating the following recommendations into disaster management strategies. These recommendations have been made in hope of bringing some positive change to the future of disaster management both by disaster management officials and the public.

Because photo and video messages received such a high number of responses, it is recommended that both the public and disaster management officials make greater use of visual components within their messages when faced with future disasters. Authorities can use Facebook as an extra source to disseminate emergency information to the public. Emergency managers should either set up social media groups related to addressing disasters or make their already established groups well known to the public. It seems to be a common phenomenon that the public create their own discussion groups on social media during times of crisis. Thus, it would be beneficial for authorities to monitor these groups that are created on various social networks during a disaster event, so as to maximise the users' knowledge of the disaster and respond to posts from the public. With official presence in discussion groups, clarity may be given to any messages posted, which could possibly reduce the dissemination of fake or incorrect information.

Because social media is emerging as a platform and tool for crisis communication, it would be beneficial for disaster managers and emergency services to evaluate their presence on social media. They should develop more flexible, comprehensive and efficient approaches for using social media during disasters. This also includes training staff on how to use social media effectively. Developing a system for archiving of social media data would also be beneficial; any messages deleted from social media sites during a crisis will then still be available on this system. Officials can examine this information after the crisis and use it to assess and reflect on their use of social media during the event, and improve their communication for future disasters.

8 RECOMMENDATIONS FOR FUTURE RESEARCH

Recommendations for future research:

- Messages were only examined up to one month after the fire. To properly analyse how Facebook aided in disaster recovery and rehabilitation, a much longer period should be analysed.
- Only one Facebook group relating to the fire was examined. If several groups are analysed and cross-referenced, a more in-depth study could be conducted.
- Content examination on its own gives a limited understanding of how social media is used. Surveys and interviews would add a more detailed insight.
- It would be interesting to determine whether content of messages regarding the Garden Route fires differed between platforms. For example, Facebook data could be compared with Twitter data to discover whether people communicated differently between these two platforms. This could help determine whether the results from Facebook, for example, could be applied to other social media platforms.
- Discovering which social media platform is the most popular amongst South Africans could benefit both disaster managers and the public as they could use this platform to find more information on disasters than the platform they may currently be using.
- Research into developing a system in South Africa that can accurately assess and store online messages would greatly improve time spent on analysing and sorting through online messages during times of crisis.

Word count: 17, 751

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APPENDICES

Appendix A Ethical Clearance

Appendix B Turn it in report

APPENDIX A



UNIVERSITEIT
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NOTICE OF APPROVAL

REC Humanities New Application Form

12 June 2018

Project number: 1933

Project Title: How People Affected by Disaster use Social Media: A case Study of the 2017 Knysna Wildfires

Dear Miss Derryn Lendrum

Your REC Humanities New Application Form submitted on 30 May 2018 was reviewed and approved by the REC: Humanities.

Please note the following for your approved submission:

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
12 June 2018	11 June 2021

APPENDIX B



Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

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Turnitin Paper ID (Ref. ID)	1016012631
Submission Title	D Lendrum 17736730 MPhil Thesis
Assignment Title	Derryn Lendrum
Submission Date	08/10/18, 16:21

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1	trauma.massey.ac.nz Internet Source	2%
2	www.nifc.gov Internet Source	1%
3	Submitted to University... Student Paper	1%
4	ajem.infoservices.com... Internet Source	1%
5	link.springer.com Internet Source	1%
6	epubs.surrey.ac.uk Internet Source	<1%
7	scholar.sun.ac.za Internet Source	<1%

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