

Use of Social Media in Disaster Management: A Review

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ABSTRACT

Every year several disasters, natural as well as man-made, strike across the globe causing loss of human lives as well as property. So, the country facing disaster events is pushed many years back due to the destruction of property and infrastructure. Due to environmental changes number of disaster events are increasing every year posing challenge to the world regarding prevention, mitigation and management of disaster operations. Being unpredictable all natural disasters cannot be prevented completely but by the effective use of technology, the loss in life and property can be reduced to a greater extent. In this modern era, social media platforms have become a part of daily life and the number of social media users is continuously increasing. General public can report the incidents related to disaster events through social media and thus contribute in monitoring of disasters. Effective disaster management is essential to mitigate and minimise the loss of life and property during disaster. Relevant information from social media increases the effectiveness of disaster management and hence reduces the impact of natural disasters. In this study a literature review is conducted on the role of social media in effective disaster management.

Key words : Disaster, Environmental changes, Social media, Disaster management.

Introduction

Since the origin of life on earth, disasters are continuing to hit the earth. It is not possible to stop the occurrence of disasters completely. Disasters may be natural or manmade. From time to time several definitions have been given for disaster by various agencies. According to W.H.O. "A disaster can be defined as any occurrence that cause damage, ecological disruption, loss of human life, deterioration of health and health services on a scale, sufficient to warrant an extraordinary response from outside the affected community or area". American Red Cross (ARC) stat "A disaster can be defined as an occurrence either natural or manmade that causes human suffering and creates human needs which the victims cannot alleviate without assistance". Thus, we can say that disasters cause major economic losses, killing or injuring large number of people and in-

flicting serious damages to environment. Over the last decade, more than 880,000 people had been killed by 4777 natural disasters. Also, the property, health, and jobs of about 1.9 billion people have been affected causing economic losses of approximately \$685 billion around the world (Kirschenbaum, 2019). Thus, to mitigate the damage and destruction caused by disaster an effective disaster management is needed. Effective disaster management demands intelligent infrastructure for the collection, integration, management, and analysis of a variety of distributed data sources, including ground-based sensors, video streaming, and satellite imagery (Adeel *et al.*, 2019). Information technology specially, social media can be used as a major tool in effective disaster management. During the time of natural calamities or natural disasters like earthquake, flood, hurricane etc. when all the wired connections got down, social media appears to be more

beneficial. Social media includes all the devices and platforms which allow people to create and share the information globally at low cost. With invention of smartphones, social networking tools i.e., Facebook, Twitter, Instagram, Whats App, YouTube etc. has become a part of daily life. Currently there are 3.78 billion social media users worldwide, equivalent to about 48% of the world's population (Mohsin, 2021). So, the social media generated a large volume of data with wide variety which can be used in effective disaster management to reduce the impact of natural disasters. The relationship between social media and disaster management has been studied by various authors who have highlighted numerous benefits of using such platforms in this area. In this mini review the role of social media has been reviewed in disaster management taking various examples.

Research Methodology and Literature Review

The sources of this study are the Scopus and Web of Science databases because of being largest databases for academic papers. We used research papers, conference proceedings of last five years. At some places the work based on recent studies is taken from the books also.

Nair *et al.* (2017) studied use of social media during country's worst flood in 2017. It was found that Twitter has contributed a lot in providing up to date information from the affected areas during the Chennai flood. The tweets were collected and analysed using machine learning algorithms such as Random Forests, Naive Bayes and Decision Tree. Authors reported that during a disaster, the most reliable algorithm among three is Random Forest. Authors also reported that India today and DT Next were the most influential users of Chennai Flood. It was inferred that these results could be used for managing and planning disaster relief measures in future.

Finau *et al.* (2018) analysed the use of social media before, during and after Tropical Cyclone Winston, the strongest recorded tropical storm which hit Fiji during February 2016. Before the cyclone, social media was used to inform citizens about the cyclone. During the cyclone people use it to broadcast their experiences and following the cyclone it brought the nation as well as the international communities together to assist people of Fiji in recovering from destructive effect of the cyclone. Authors found that instead of replacing the traditional

modes of communication, social media was complementary to them as well as mainstream media. In a previous study Finau (2014) had reported limitations of social media in developing countries due to limited internet coverage and higher cost of accessing social media. Furthermore, Bird *et al.* (2012) have argued that social media may lead to the spread of false information and rumours that could lead to public anarchy. However, in above study the information shared on social media was quite accurate and the people relied on information shared by their relatives, friends and trusted pages.

Kim and Hastak (2018) investigated the Facebook social network in the city of Baton Rouge after the 2016 Louisiana flood. People of the city used both Twitter and Facebook to share emergency information. Facebook user engagement was higher than Twitter during the emergency responses. The study revealed that social networks consist of three entities: individuals, emergency agencies, and organizations. They all were actively engaged to share information, communicate with the city of Baton Rouge, and to update the information. Emergency agencies and organizations are on the periphery of the social network, connecting a community with other communities.

In May 2016, an enormous wildfire threatened the city of Fort McMurray, Alberta and forced the evacuation of all of the city's residents. Boulianne *et al.* (2018) examined Albertans' response to the wildfire by exploring the role of social media in facilitating care and help to the residents. For this study the authors analysed most popular Tweets related to the wildfire and an Alberta survey collected months after the disaster. The study revealed that those following news about the wildfire on social media express higher overall levels of care and concern for affected people, leading to their help.

Bhuvana and Aram (2019) studied the use of Facebook and Whats App in disaster management during Chennai floods of 2015, by residents of Kotturpuram and Mudichur, two of the worst-affected areas in the city. Authors found that during Chennai floods the use of Whats App and Facebook surpassed the use of conventional communication tools i.e., radio and television. It was found that Facebook and Whats App chats have given valuable information about the needs and requirements of the residents at times of a disaster in Chennai. Interestingly, the study was carried out on a city which is not prone to disasters so it disclosed the use of social

media as a disaster management tool when all of a sudden, a disaster struck. Also, the author discussed the concept of reverse agenda-setting using social media during the time of disasters. Generally, the conventional mass media set agenda and people follow it but expansion of the social media has given rise to reverse agenda-setting i.e., not the media but the public propose issues on the agenda and it is accepted by the conventional media as public agenda. It was concluded by authors that from being mere a communication tool, social media facilitated disaster management during the floods. The information gathered from Facebook and WhatsApp chats can be used to find out resource needs and gaps in resource distribution which will be helpful in disaster management.

Sakurai *et al.* (2019) reviewed the role of information technology in information record, exchange and process for effective disaster management. Information record and exchange are important functions prior to disaster while information process and exchange are important for disaster relief operations. Authors found that discussions of technology use in each disaster phase are scattered so they concluded that for effective use of information technology in all the four stages, a proper strategy is required, which would enhance the effective disaster management at local government level.

Lovari and Bowen (2019) investigated the use of social media during a flood disaster managed by a public affair's officers. The use of social media is considered a positive tool in the disaster of the South Carolina floods. However, there was some lack of coordination among the governmental agencies and public sector bodies which can be overcome. Kankanamge *et al.* (2020a) investigated community engagement levels of social media channels during disaster management. To evaluate the levels of community engagement they consider five indicators-popularity, virality, commitment, engagement and utilisation. The study revealed that: (a) To capture dispersed community knowledge on disaster management, social media acts as a promising tool though it's utilisation is still low; (b) Community engagement levels can be increased by sharing social media posts with images and animated maps and; (c) Posts shared with an aim to increase the situation awareness, receive greater community attention than the other posts.

In various studies by Boulos *et al.* (2011), Sievers (2015), Kantarci *et al.* (2016), Ludwig *et al.* (2017) and

Kankanamge *et al.* (2020b), it was also found that community engagement towards the Twitter social media channel is comparatively low. However, Twitter is more appropriate for analysis in compare to other social media channels so it has been widely used across the world to analyse social media data related to disasters. Dufty (2016) emphasised in a study that to avoid the spreading of any misinformation in the social media, authorities need to response rapidly. For instance, during the 2012 Hurricane Sandy, around 10,000 tweets were identified as fake. Among them, 86% of tweets, spreading fake information were re-tweeted.

Zamarreño-Aramendia *et al.* (2020) investigated the use of social media, specifically Twitter, during the forest fires in Artenara and Valleseco, Canary Islands, Spain, during summer 2019. Authors found that the Canarian authorities instead of using messages to prevent future natural disasters, used a digital-communication strategy only on the basis of information and live updates received on forest fires. Therefore, authors highlighted the need to deeply investigate the use of social media, especially Twitter, as tools to sensitize citizens to be proactive in natural-disaster prevention.

In 2020 Kavotaa *et al.* (2020) carried out a study in North and South Kivu regions in the Democratic Republic of the Congo. In this study they examined the adoption factors of social media and its impact in disaster management. To examine the adoption of social media by people of Congo region, they used three theories Technology acceptance model, diffusion innovation theory and the Kahn's framework of psychological conditions and agility. They proposed a research model based on these theories and tested it with a sample of 418 respondents using Partial Least Squares Structural Equation Modelling method (PLS-SEM). The study revealed that social media platforms are perceived to be easy to use, useful as they give a good quality of output, and enhance the image in the society. The actual use of social media causes enhanced information accessibility, flexibility and proactiveness in disaster situations.

Conclusion

In this paper, a mini literature review is conducted to study the role of social media in disaster management. The study revealed that social media is being used frequently for disaster management around

the world. All the social media platforms i.e., WhatsApp, Facebook, Twitter and YouTube are being extensively used by people as well as government to carry out effective disaster management. Twitter is being used as most reliable source for information gathering during disaster. It is also seen that machine learning algorithms have an important place in these studies. Social media has also caused reverse agenda-setting and is being proved more effective during disaster management than conventional media.

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