

**INVESTIGATING THE ROLE OF SOCIAL MEDIA
PLATFORMS IN DISASTER RISK COMMUNICATION
IN SRI LANKA**

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DECLARATION

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Abstract

Disaster Risk Communication (DRC) is one of the key elements adopted by the global community to reduce the adverse effects of catastrophic disasters. Several drawbacks were identified that caused the ineffectiveness of the DRC in Sri Lanka. One of the significant downsides is the deficiency in proper communication channels for the impactful propagation of disaster-related information. Social media plays a crucial role in developed countries, with previous studies proving its beneficial impact on global disasters.

Previous scholars have recognised the possibility of enhancing the efficiency of the DRC in Sri Lanka by utilizing social media. However, there is a lack of proper investigation done based on the exploration of adapting and enhancing social media practice toward the DRC in Sri Lanka. Therefore, the main objective of this study was to identify the existing gaps and barriers by investigating the prevailing use of social media for DRC in Sri Lanka.

Through a comprehensive literature investigation, several aspects of using social media during disasters as a communication channel were identified. Consequently, a conceptual framework was developed for utilising social media for Disaster Risk Communication in Sri Lanka. The subsequent section of the study analysed the use of social media in DRC in Sri Lanka based on the critical parameters of that framework. Different data collection methods, such as online questionnaires, telephone surveys, and social media surveys, were used to obtain the required data for the analysis. Besides, various analytical techniques were used to conduct the analysis.

Several conclusions were drawn from the analysis results, which provide numerous suggestions for bridging the gaps and barriers identified from the analysis. The outcomes of this study will help in enhancing social media usage for Disaster Risk Communication in Sri Lanka.

Keywords: Disasters, Disaster Risk Reduction, Disaster Risk Management, Disaster Risk Communication, Social Media

CHAPTER 1: INTRODUCTION TO THE RESEARCH

1.1. Background

Sri Lanka has over the years encountered a number of hazards that have culminated in devastating disasters [1]. The most familiar natural hazards which were encountered includes floods, hurricanes, strong winds, landslides and droughts while the other reported hazards were persuaded utterly or mainly by human actions and decisions [2]–[5]. In Sri Lanka, the hazards and their severity have escalated quickly due to a number of factors, including climate change, population growth, hasty industrialization, and many other natural and man-made activities [6]. Based on the findings of the Global Climate Risk Index 2019, Sri Lanka was identified as the country most significantly impacted by the consequences of climate change in the year 2017 [7]. The disaster event profile of Sri Lanka mainly highlights the crucial damages triggered over the recent years because hazards and subsequent disasters have made vital impacts on human lives and properties [8]. As a developing country, hazards that trigger disasters reflect a substantial setback to the economic and financial development of Sri Lanka.

In order to minimize the damaged content and reduce the impact occurring on the vulnerable community, several global concerns emerged, and global frameworks were introduced. The concept of Disaster Risk Reduction (DRR) originated from the collective endeavours of key authorities, culminating in the establishment of the Sendai Framework for Disaster Risk Reduction 2015-2030. Drawing on the insights garnered from the Hyogo Framework for Action (2005-2015), it becomes apparent that reducing the risk associated with disasters is a prudent economic strategy aimed at mitigating potential losses. Moreover, the implementation of efficient disaster risk management practises plays a pivotal role in fostering sustainable development. In order to reduce the disaster risk and avoid the damages caused by disasters, it is crucial to have a proper plan and preparedness at different levels. Sendai Framework (2015-2030) has been developed with the consequence of the considerable deduction of disaster jeopardy and impacts in lives, livelihoods as well as other factors in implementing suitable actions that avoid and decrease hazard contact and

defencelessness to disaster, increase preparedness for response and recovery, and thus strengthen resilience. The Multi-Hazard concept has been introduced in conjunction with the initiation of the "Sendai Framework for Disaster Risk Reduction 2015-2030" within the organisation. The MHEW mechanism has been devised as a means of assessing Disaster Risk Reduction (DRR) by improving the efficacy of communication systems. This mechanism ensures the timely and accurate dissemination of information to individuals who are at risk during a disaster scenario [6], [9], [10]. The multi-hazard approach is mainly defined as reflecting more than one hazard in a given location. The prominence of interconnectivity among individuals in relation to potential associations became more apparent, shifting the focus away from isolated hazards. One of the objectives set forth in the Sendai Framework for Disaster Risk Reduction 2015–2030 is to substantially enhance the reach and usability of multi-hazard early warning systems, as well as disaster risk information and assessments, to individuals by the year 2030. Within the framework of the Multi-Hazard Early Warning (MHEW) system, the Sendai Framework emphasises the significance of adopting a Multi-Sectoral approach to early warning mechanisms in the field of Disaster Risk Reduction (DRR) [11].

Early Warning Dissemination and Communication has been introduced as one of the fundamental elements of the MHEW mechanism [12]. Considering the prevailing MHEW mechanism in Sri Lanka, several gaps have been identified elaborating on the warning dissemination and communication in MHEW mechanisms in Sri Lanka that need improvement in productivity and efficiency. Previous scholars have concluded that there are several problems with the existing warning dissemination and communication process in terms of timeliness, accuracy, clarity, and credibility. Furthermore, various factors have been identified as contributing to the limitations of existing hazard early warning mechanisms in Sri Lanka. These factors include age, limited technical knowledge and resources, lack of confidence in utilising modern communication methods, and the inefficiency of current traditional modes. The identification of existing deficiencies and attributes of the current MHEW mechanism in Sri Lanka highlights the pivotal role of meeting community expectations in enhancing public trust in the existing MHEW systems. Among the various types of

community expectations, delivering timely and accurate information via a reachable mode is the utmost prospect of the Sri Lankan community [6], [17]. One of the main points identified from the above gaps is the mode of communication that communicates information linked to the disasters by the community in Sri Lanka. In order to enhance the efficiency of the MHEW mechanisms, it is necessary to have an effective communication mechanism [18]. Even though the Sri Lankan community uses traditional modes of communication for disaster-related communication [19], scholars have investigated that there is good potential to adopt modern technological applications for communication linked to the catastrophes of the country.

Hence, the central objective of this research was to investigate the integration of contemporary communication technology into the existing DRC practises in Sri Lanka. Touching the Sri Lankan context, mobile phone usage might be deemed high, as evidenced by the previous studies. It is crucial to take swift action to become accustomed to the most recent technological breakthroughs in Sri Lanka's disaster-related communication procedures. Furthermore, characteristics such as timeliness, suitability, correctness, and uncomplicatedness must be carefully focused on while integrating the unique technical applications linked with DRC in Sri Lanka. With the future growth plans combined with the country's Disaster Risk Reduction (DRR) strategy implementation, approachability and coverage in the attainment of mobile-based applications must be established. In addition, the efficiency level, trust level, and community awareness level can all be used to gauge how the community feels about modern communication platforms. Researchers have identified that field investigations can be incorporated into development strategies and frameworks to reach out to community target groups in catastrophe scenarios [20]. As a result of these concerns, the community's trustworthiness in current technology platforms must be reinforced by increased awareness and efficient transmission of disaster-related information [21].

Social media platforms are key modern communication technologies in Sri Lanka considering the new technology adaptation for information dissemination during disasters. The implementation of disaster risk reduction (DRR) strategies can be

enhanced through the adoption of productive social media consumption [22]. Many researchers have conducted various case studies to investigate the feasibility and applicability of social media for knowledge transmission throughout disasters. Through statistical published data, it can be determined that a considerable social media usage is available in Sri Lanka [23]. Even though social media is used in Sri Lanka massively, it is still not used for disaster-related communication effectively [24]. Nevertheless, researchers have identified that for Disaster Risk Management in Sri Lanka, there is a necessity for functioning social media platforms, and adopting social media in Disaster Risk Management is a demand and expectation of the relevant organizations [25].

As identified above, there is an excellent possibility to develop social media usage effectively and appropriately throughout the disaster events in Sri Lanka. However, there is still neediness to enhance social media platforms usage throughout the calamities, highlighting the need for a comprehensive study representing the practical usage of such platforms throughout catastrophes during Sri Lanka. Hence, the present study primarily aimed to improve the utilisation of social media during disaster situations in Sri Lanka, employing a suitable research methodology identified from the existing literature.

The literature review has recognised that having a proper community-based framework helps to the prevailing DRC mechanism in a country [26]. Hence, the objective of this study is to construct a community-oriented structure for examining the DRC within the context of Sri Lanka. In order to address the above-identified research gap from the present study, several scope limitations were considered to develop the proposed Multi-Hazard Early Warning framework. The proposed framework in this study was developed based on the parameter of warning dissemination and communication, which is one of the four key parameters in the Multi-Hazard Early Warning mechanism. The current framework was established through the deliberate choice of utilising social media as a means of communication for Disaster Risk Communication in Sri Lanka. This decision was made within the broader context of considering different approaches to warning dissemination

communication parameters. Hence, the present study aims to establish a conceptual framework that utilises social media as an early warning communication tool in the context of disaster management in Sri Lanka. The primary aim of this study was to identify the principal domains related to the utilisation of social media platforms for global DRC through an analysis of existing scholarly literature. A framework was constructed by analysing the adaptability of major areas to the Sri Lankan context, thereby identifying key aspects.

The framework that has been developed provides a comprehensive analysis of the key stakeholders at various levels who possess a substantial potential to utilise social media for the purpose of Disaster Risk Communication in Sri Lanka. The identification of these areas is deemed crucial for the development of social media usage in the context of disaster management in Sri Lanka. Subsequently, the current investigation examined the application of social media as a means of communication in Disaster Risk Communication by stakeholders at different hierarchical levels, employing the established framework. A range of data collection methods, including online and physical questionnaires, explorations, and observations, were employed to investigate the behaviour of the stakeholders. Multiple analysis techniques were employed to examine the data acquired through the diverse data collection methods. The objective of this study was to identify the existing gaps and obstacles in the utilisation of social media platforms during times of disasters in Sri Lanka. Consequently, this study culminated in the development of a comprehensive community-based framework for the MHEW mechanism in Sri Lanka. The establishment and utilisation of a meticulously organised MHEW methodology holds significant importance in Sri Lanka, as it functions as a highly effective practise for mitigating disaster risks.

1.2. Objectives of the Study

Upon conducting a comprehensive review of the existing literature, it becomes evident that a multitude of studies have been undertaken globally to investigate the utilisation of social media platforms in the context of disaster situations. Various study methodologies have been employed to carry out these investigations, which encompass the creation of conceptual frameworks. The literature has identified the

utilisation and individuals who engage with social media as the paramount elements in the context of employing such platforms during times of disasters. Upon conducting a comprehensive review of existing literature, it was determined that no prior research has been undertaken to develop a framework that establishes a connection between social media users and their utilisation in the context of disaster situations. Furthermore, it is worth noting that there is a dearth of comprehensive research conducted on the utilisation of social media platforms during disasters in Sri Lanka. Additionally, there is a notable absence of empirical evidence pertaining to the efficacy of social media utilisation in previous disaster scenarios. Prior research has established Sri Lanka as a nation with a high susceptibility to natural disasters within the South Asian region. Therefore, the primary objective of this study was to evaluate the current usage of social media in the context of disaster scenarios in Sri Lanka. This investigation also took into account two crucial dimensions of social media usage, namely the users involved, and the purposes served in such circumstances. As mentioned earlier, the main objective of this study was to develop a community-based framework that is appropriate for the specific context of Sri Lanka. The framework was constructed through a comprehensive analysis of relevant scholarly literature, with careful consideration given to the two fundamental dimensions of social media utilisation in disaster contexts: the individuals who engage with it and the underlying motivations driving their usage. The present study aims to address the identified research problem by developing a proposed framework that specifically focuses on the warning dissemination and communication component of MHEW. Additionally, the study explores the utilisation of social media as a means of enhancing Disaster Risk Communication.

The research study comprises discrete sub-objectives that were formulated based on the utilisation of social media as a means of disseminating information during times of disasters.

1. To identify the stakeholders (users) at different levels who use social media.
2. To identify the possible ways to use social media (uses).
3. To identify the critical parameters of users and uses of social media.

4. To develop a conceptual framework based on the recognised users and uses and their parameters.
5. To determine the differences in user connectivity that built through social media.
6. To explore the current usage behaviour of various social media platforms by identified users.
7. To identify gaps and barriers to the prevailing situation and propose suggestions to enhance the future practices.

1.3. Scope and Limitations

The present inquiry primarily focuses on the utilisation of social media within the context of disasters. The primary objective of the study was to analyse the scope of the Multi-Hazard Early Warning mechanism and its constituent elements. Additionally, the study aimed to explore the different communication mechanisms and modes used in various sectors and communities. The Multi-Hazard Early Warning mechanism is a comprehensive and intricate approach to Disaster Risk Reduction (DRR) that has been developed by experts in the field of Disaster Risk Management. Therefore, the current study was limited to the field of Warning Dissemination and Communication, which plays a vital role in the Multi-Hazard Early Warning Mechanism. Furthermore, it is important to note that the focus of this research was restricted to the investigation of the communication mechanism known as Disaster Risk Communication (DRC) within the specific context of Warning Dissemination and Communication in times of disasters. There exist various communication channels that facilitate the dissemination of information in the Democratic Republic of Congo (DRC). The main objective of the current study revolved around examining the use of social media as a modern means of communication during times of disasters, in addition to other various communication strategies. A thorough examination of relevant scholarly articles and publications was undertaken in order to develop a comprehensive theoretical framework for the effective utilisation of social media platforms in the context of disaster management in Sri Lanka. This review encompassed both global and local perspectives, providing a detailed understanding of the subject matter. The framework

mentioned above enabled the identification of crucial sectors in Sri Lanka during disasters by utilising social media. The sectors were classified into two primary categories: 'Users' and 'Uses'. A subsequent analysis was undertaken, placing particular emphasis on the 'User' group, in order to examine the behavioural patterns of societies in Sri Lanka at various stages of involvement in the Disaster Risk Management process. Given the current circumstances, recent scholarly investigations have produced a range of discoveries that hold promise for improving the effectiveness of social media platforms in Sri Lanka for the distribution of information pertaining to disasters. The foundation of this framework is predominantly shaped by an examination of societal conduct within the nation, while staying within the specified parameters and constraints mentioned earlier.

1.4. Structure of the Thesis

The thesis is organized in the following order:

Chapter 1: Includes the background for the study and description of the research problem taken into consideration for the present study. Apart from that, the aim, objectives and scope and limitations of the present study have been described.

Chapter 2: Includes a comprehensive literature review related to the current study. First and foremost, a detailed description has been presented of the disasters that occurred worldwide and the severity of their impact, which shows the utmost importance of conducting this present research study. After that, several terminologies have been discussed, which are commonly used in disaster-related literature, which is helpful for further understanding of the study. Afterwards, global interventions toward managing disasters and their impact were discussed, focusing on the Multi-Hazard Early Warning concept. Subsequently, disaster-related communication was concerned with the various modes of communication and mechanisms. This chapter has provided an analysis of the advantages and disadvantages associated with various communication channels, as well as an examination of the existing mechanisms employed in the context of disaster-related communication. The utilisation of social media on a global scale as a means of transmitting disaster-related information has been examined in the

context of this chapter. The discussion of the benefits derived from effectively utilising social media for disaster-related communication has taken place, taking into account the recent global incidents that the international community has encountered. There exists a significant discourse surrounding the prevailing Multi-Hazard Early Warning methodology in Sri Lanka. The examination conducted in this study has facilitated the identification of significant deficiencies and obstacles within the current early warning system, as outlined in this chapter. Various communication channels have been examined, encompassing the utilisation of social media platforms by stakeholders involved in disaster management within Sri Lanka. The provided information is advantageous in discerning the research gap within the current study. This chapter primarily focuses on the various methodologies employed in studying the use of social media during global tragic events, as well as the theoretical frameworks utilised for the analysis phase of the research.

Chapter 3: Includes a detailed methodology followed for the present research study.

Chapter 4: Includes a detailed description of developing the conceptual framework for using social media throughout catastrophes in the Sri Lankan background.

Chapter 5: Includes a detailed analysis of the identified significant components of the developed framework. Different data collection methods, such as online questionnaires and social media surveys have been used for this analysis, and various analytical techniques were used. The analysis of the present study was conducted in four sections: non-influenced general community, social groups, influencers, and government disaster management stakeholders.

Chapters 6 and 7 include the conclusion, references, and annexes.

CHAPTER 2: LITERATURE REVIEW

During the preliminary stage of the research, an extensive review of the existing literature was undertaken to examine the prevailing approach to the Multi-Hazard Early Warning (MHEW) mechanism, both globally and within the context of Sri Lanka. A comprehensive review of the existing literature has been undertaken, encompassing scholarly articles, reports at both global and local levels, policies, legal frameworks, news articles, and various online sources such as websites. The process of selecting pertinent scholarly publications was conducted in a systematic manner. In order to ascertain scholarly literature regarding the utilisation of social media during catastrophic events in Sri Lanka, a thorough exploration was conducted across notable academic databases such as Google Scholar, ScienceDirect, and Scopus Library. The primary terms utilised to conduct searches for pertinent articles in databases are Social Media, Disaster Risk Communication, Disaster Risk Management, and Disaster Risk Reduction. The papers included in this study were chosen based on their examination of the challenges and transformations that have arisen from various approaches to utilising social media in times of disasters. Furthermore, the review exclusively included publications written in the English language. In addition to the retained publications, a manual search was conducted to include an additional set of publications and literature in the examination. In this investigation, a total of 60 sources were consulted, adhering to the aforementioned criteria for inclusion and exclusion.

In this chapter, the findings of the literature review were aligned to construct this study. For ease of study, the facts obtained from the literature review are mainly divided into two parts and presented in this chapter.

PART – I

This part of the literature review includes an introduction to the disasters considering worldwide occurred disasters and their statistics. Furthermore, definitions of terms required for the study of disasters are made, and how they relate to each other is clearly stated here. Likewise, the existing global policies and frameworks on disaster are elaborated, and the crucial components of those frameworks and policies are further elaborated for conducting this present study. By considering the critical components of global policies and frameworks, this part of the literature review has illustrated the importance of communication in disasters, among the other activities carried out in a disaster. Ultimately, different channels used for communication in disasters have been addressed in this part and the challenges of using conventional media in disasters.

2.1. Introduction to Disasters

As per the 2017 Terminology of the United Nations Office for Disaster Risk Reduction (UNDRR), a disaster refers to a substantial disruption in the functioning of public activities or any societal structure resulting from various hazardous incidents [27]. Its gravity usually magnifies with the revelation of circumstances, defencelessness, potentiality, and consequential sufferers, which impact human lives, assets, the economy, and the environment in a country [28]. Many disasters have been taking place worldwide, triggered by several types of natural to anthropogenic hazards [29]. The occurrence of these catastrophic disasters has led to significant levels of detrimental destruction and the loss of human lives and assets, which have been documented on a global scale. Table 2-1 presents a comprehensive overview of the situational data pertaining to the disasters that have transpired within the preceding four decades [30].

Table 2-1: Circumstantial facts pertaining to worldwide catastrophes that have occurred within the past four decades

	Reported Disasters	Total Deaths	Total Affected	Economic Losses (USD)
1980 - 1999	4,213	1.20 million	3.26 billion	1.64 trillion
2000 - 2019	7,349	1.24 million	4.04 billion	2.98 trillion

Table 2-1 shows a substantial increase in reported data from 2000 to 2019 compared to 1980 to 1999, where recorded disasters and economic losses have almost doubled. The numbers have been amplified over time due to a variety of both environmental and anthropogenic factors, such as climate change, population growth, and accelerated urbanisation, among others [31]. Extreme weather conditions caused by climate change have become a remarkable component in escalating disasters and their effects worldwide in the 21st century [32]. This phenomenon has also been shown in a report released by the UNDRR for the International Day for Disaster Risk Reduction in 2020 [33].

In recent years, there seems to have a notable increase in the occurrence of catastrophic events resulting from environmental or human-induced factors, as evidenced by global reports. The year 2020 serves as a prominent illustration of this trend [34]. The COVID-19 pandemic emerged as a significant global crisis in 2020, affecting numerous countries across the globe [35]. The number of coronavirus-infected patients and deaths has accelerated exponentially around the world since 2020. By the 15th of January, 2021, 17:42 GMT, more than 93 million people had been infected with coronavirus globally, while more than 2 million people had died from the virus infection [36]. Furthermore, according to the World Bank's estimation, the global gross domestic product experienced a contraction of 5.2% in the year 2020 as a consequence of the COVID-19 pandemic. This downturn has been recognised as the most severe global recession witnessed in several decades [37].

Furthermore, the Amphan Cyclone [38], California Wildfires [39], Hurricane Laura [40], the earthquake in Turkey, Locust Swarms in East Africa, Parts of India and Asia [41], the volcano eruption in the Philippines, and the explosion in Beirut [42] were several other disasters reported worldwide in very recent years. The annual report of Munich Re shows that around 8200 fatalities had been reported due to the destructive natural disasters that occurred in 2020. It resulted in a \$210 billion financial loss in damage which was a sharp increase from the \$166 billion global bills in 2019 [43].

2.2. Disaster Risk Reduction (DRR)

The objective of DRR is to prevent the occurrence of new disasters, decrease existing disaster risks, and effectively manage any remaining risks. These efforts are crucial in strengthening resilience and achieving sustainable development. [44]. Basically, DRR comes up with policies and frameworks to define disaster risk reduction plans and strategies. With the increasing nature of disasters worldwide, the focus rests on implementing different measures to mitigate the disaster impacts and enhance the resilience measures over them [45]. DRR strategies and policies define diverse timescales and concrete goals, measures, and time frames. Investing in DRR protects lives and money while confirming that development gains are sustainable in the future [46]. DRR investments do more than decrease catastrophic losses as they also deliver economic, social, and environmental benefits that enhance a nation's and society's comfort and resilience [47].

2.3. Disaster Risk Management (DRM)

DRM involves the implementation of Disaster Risk Reduction (DRR) policies and strategies aimed at enhancing preparedness for disasters and mitigating their impact on communities [48]. DRM efforts include mitigation, aiming to reduce potential losses; readiness and emergency management, focusing on protecting lives; and post-crisis management, aiming to re-establish programs that support human activities [49]. Disaster Risk Management (DRM) encompasses a comprehensive compilation of events and measures undertaken prior to, during, and subsequent to a calamity with the aim of averting the occurrence of a disaster and mitigating its impact [50]. The Disaster Risk Management process can be categorised into three distinct phases: pre-disaster, during-disaster, and post-disaster. Within the realm of hazardous events, scholarly literature has also delineated them as Pre-Event, Event, and Post-Event phases. Three distinct stages of transition can be identified: the Pre-Event to Event, the Event to Post-Event, and the Post-Event to Pre-Event [50]–[53]. They can also refer to the various periods of the cyclic actions taken in DRM [53]. The DRMC has been developed in view of these stages and relevant activities. It illustrates a continuous process through risk decrease, emergency response, and recovery phases, illuminating

the actions carried out by numerous stakeholders such as the ordinary community, government sectors, and organizations to reduce the destruction caused by disasters [50], [54], [55]. Figure 2-1 shows the various components included in the DRMC.

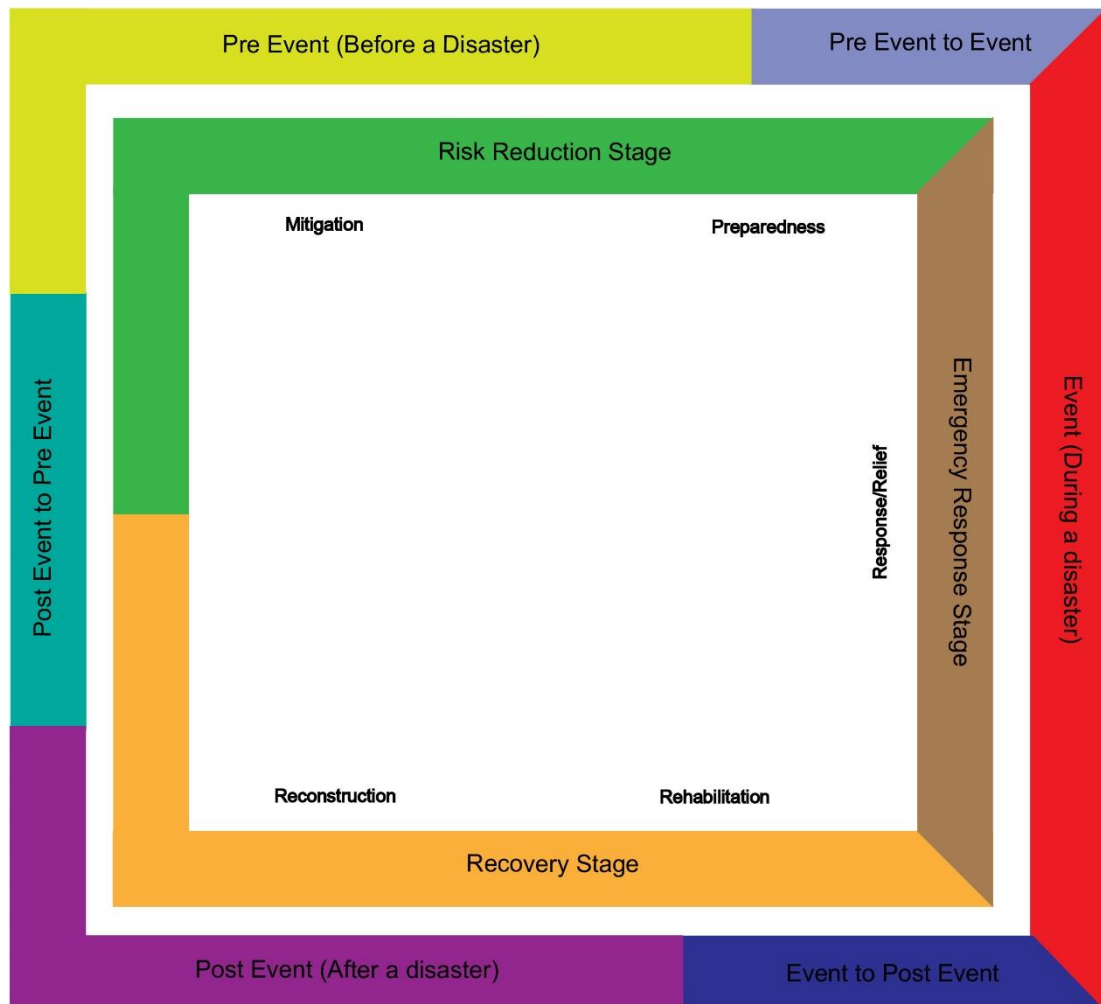


Figure 2-1: Various components in DRMC (Developed by Author)

2.4. Disaster Management Stakeholders (DMS)

Generally, the stakeholder is any cluster or individual who can impact or is inspired by accomplishing the association's goals [56]. Partners in the realm of Disaster Management encompass individuals or organisations who possess the potential to make contributions, experience impacts, or participate in the processes of preparation, reacting to, or recuperating from a disaster scenario [57]. Previous scholars have identified numerous sorts of stakeholders related to disaster management, such as

government agencies, private organizations, media, NGOs or donors, emergency insurers services, and the public [58]–[60]. Numerous fundamental characteristics that Disaster Management Stakeholders have to play in reducing disaster pervasiveness can be identified from the available literature. Consequently, it is imperative that each stakeholder fulfils their specific tasks and obligations throughout the various stages of the DRMC, namely prevention, readiness, reaction, and restoration [61].

Disaster-related communication is one of the crucial areas in which Disaster Management Stakeholders are involved in each phase of DRMC [62]. As usual, it appears that the official institutions and organizations are acting as the leading players in disaster communication while the general public is simply the audience who is receiving information and instructions [63]. Nevertheless, disaster-related communication should occur not only in a one-way method but also in a multi-directional way since the affected population needs to provide information and request help and relief [64]. This will enable the responsible authorities to understand the community's current situation and distribute disaster-related information accordingly [65].

2.5. The Global Policies and Frameworks for Disaster Risk Reduction

As a result of the rapid growth in the occurrence of hazards and their subsequent disasters, various global parties have taken different steps to reduce the impact of disasters. As an international intergovernmental organization, United Nations (UN) has taken significant actions to address the impact of disasters by developing frameworks and policies for DRR [66], [67]. These policies and frameworks establish structures and mechanisms to improve disaster preparedness, response, and recovery while integrating more practical considerations into national development planning and budgeting [68]. Since the 1980s, UN General Assembly has engaged with developed and developing countries to improve the global frameworks to intensify the collective effort to reduce natural and man-made hazards [69]. Following extensive negotiations, the United Nations General Assembly officially adopted the latest framework for DRR, known as the Sendai Framework for Disaster Risk Reduction 2015-2030. Figure 2-2 presents a comprehensive overview of the United Nations'

involvement in Disaster Risk Reduction (DRR) and the frameworks adopted by the UN during the period spanning from 1989 to 2015 [70].

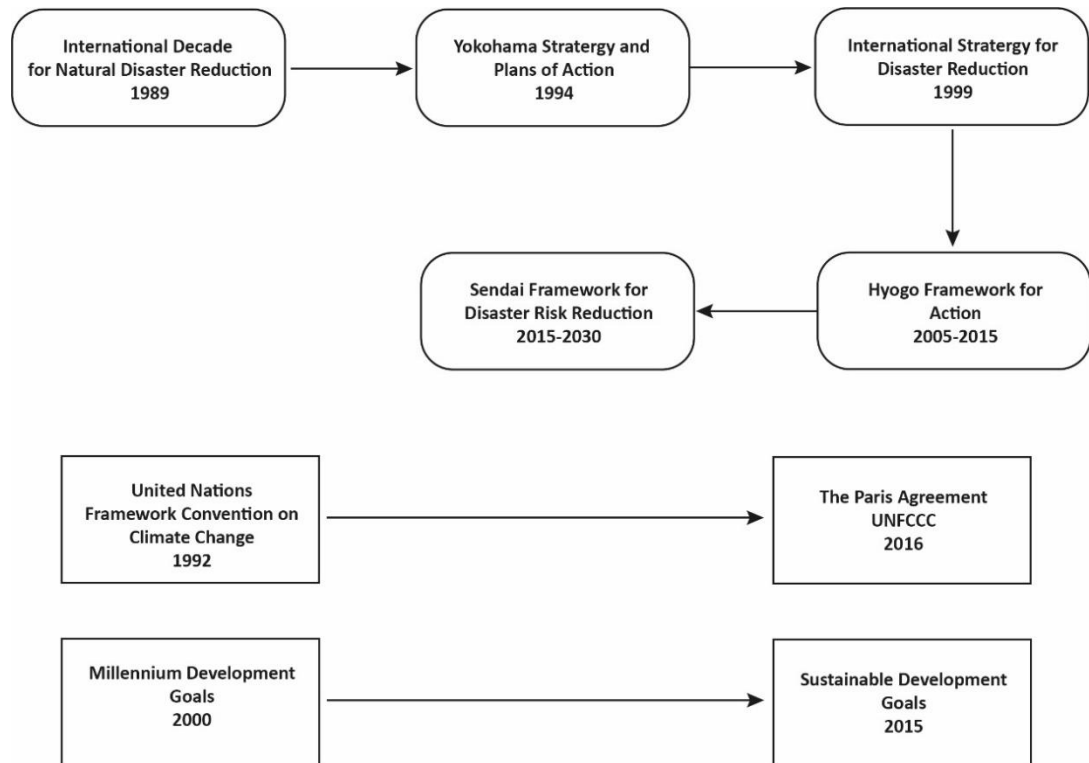


Figure 2-2: The progression of international legislation and regulations pertaining to reducing disasters

2.6. The Latest Global Framework Established for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) was officially adopted during the third United Nations World Conference on Disaster Risk Reduction, which took place in March 2015 in Sendai, Miyagi, Japan [71]. The primary objective of this framework is to achieve a significant reduction in the depletion of human life, economic resources, physical infrastructure, sociocultural elements, and ecological resources for people, businesses, societies, and nations by the year 2030 [72]. Various new approaches can be identified in the Sendai Framework, which had not been addressed in the previous frameworks, such as approaches targeting multi-hazard, multi-stakeholder, community-based, data-driven, and collective responsibility. This leading framework has introduced seven global targets to assess various indicators that require significant attention on a global scale. These

targets are aimed at helping towards the attainment of the framework's desired outcome and goal. [73].

Moreover, in this Sendai Framework, the term “Multi” has emerged as a new approach to the previous frameworks, elaborating the principles developed in the framework in multiple ways rather than individually. Multi-Hazard Early Warning is one of the perceptions emerging with the SFDRR [74]. Target "G" in the current framework exemplifies the versatility of the Multi-Hazard Early Warning system in Disaster Risk Reduction (DRR). By the year 2030, it is expected that there will be significant advancements in the accessibility and availability of multi-hazard early warning systems, as well as information related to disaster risk and evaluations, to the general public. This objective aims to highlight the importance of improving the reach and effectiveness of such systems and information dissemination [75]. In recent times, there has been a noticeable shift towards prioritising multi-hazard strategies and mindsets over individual hazard considerations. The concept of multi-hazard attitude primarily pertains to the recognition of multiple hazards occurring in a specific geographical area, as well as the interconnections between these hazards, taking into account their potential relationships [76].

2.7. Multi-Hazard Early Warning (MHEW) Mechanism

The MHEW mechanism is responsible for managing a range of hazards that may occur independently, simultaneously, in a cascading manner, or incrementally over time, along with their potential interconnected impacts [77]. The involvement of a variety of fields in the identification and monitoring of various hazards leads to enhanced effectiveness as well as uniformity in issuing warnings, thereby ensuring that the risk assessments remain up-to-date and precise [78]. The function of MHEW (Mass Hazard Emergency Warning) is recognised as a systematic approach for disseminating information to public sectors that are vulnerable to potential hazards, prior to the occurrence of physical consequences [79]. Figure 2-3 illustrates the schematic representation of the MHEW mechanism [80].

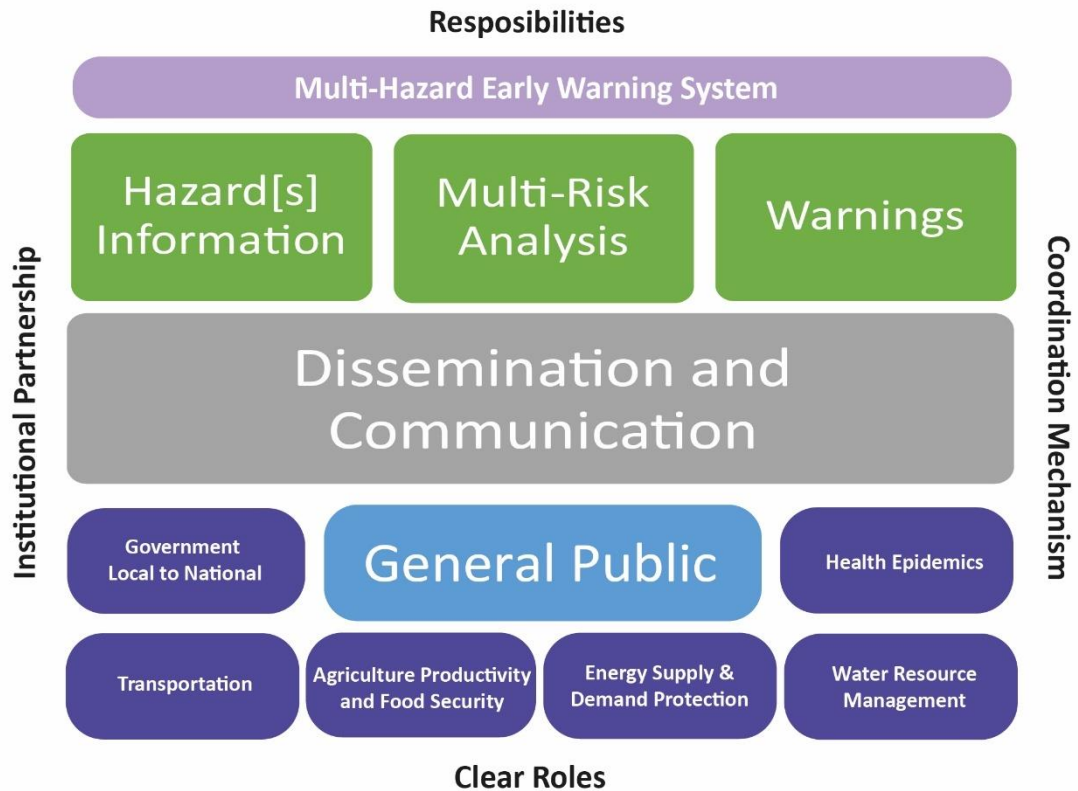


Figure 2-3: Schematic MHEW system (Developed by Author)

2.8. Components of a Comprehensive MHEW Mechanism

Within the context of the end-to-end, people centred MHEW mechanism, four key elements have been identified. Table 2-2 presents an overview of the essential components within the Multi-Hazard Early Warning system, accompanied by concise descriptions of each of the four elements in bullet point format [80].

Table 2-2: The fundamental components of a comprehensive, community oriented MHEW mechanism

Parameter	Description
Disaster Risk Knowledge	<ul style="list-style-type: none"> Major risks and threats Exposure, vulnerabilities, capacity, and risks Stakeholders' roles and duties Central repository for risk data

The Detection, Monitoring, Analysis, and Forecasting of the Hazards and their Potential Consequences	<ul style="list-style-type: none"> • Systems to detecting hazards • Hazard forecasting, as well as warning services • Institutional mechanisms
Warning Dissemination and Communication	<ul style="list-style-type: none"> • Communication mechanisms with different types of equipment • Organizational and decision-making processes • Impact-based early warning communication • Prompt actions by targeting groups
Preparedness and Response Capabilities	<ul style="list-style-type: none"> • Disaster readiness indicators • Public perception • Educational campaigns • Evaluation of the community preparedness and reaction

An efficient mechanism for MHEW, developed using the parameters mentioned above, enables people, municipalities, organisations, governments, and other stakeholders to promptly undertake measures aimed at mitigating dangers associated with hazardous events. The integration of hazard observation, predicting and anticipating, disaster risk assessment, interaction readiness activities systems, and processes is essential in order to achieve the desired outcome of an effective mechanism for MHEW [81]. In order to perform an efficient MHEW mechanism and enhance it furthermore, these four interrelated components must be coordinated within and between sectors (stakeholders) at numerous levels. Non-fulfilment of one component or the absence of coordination among them could cause the entire system to collapse [82].

2.9. Warning Dissemination and Communication

As a vital element in the MHEW mechanism, warning dissemination and communication aim to create a system that ensures that the target population is notified ahead of time about potential disasters [83]. Communities that are at risk at various levels in a country should receive warnings in advance of approaching hazardous incidents. To this end, national and regional integration and information exchange should be facilitated through communication and warning distribution mechanisms (including developing last-mile connections).

The literature review concludes that the MHEW mechanism can be considered as a proper DRR measure. Thus, MHEW practices can be adopted into the DRM by establishing a proper warning dissemination and communication system related to disasters. The Disaster Risk Communication concept plays a dynamic character in DRM, illustrating the warning dissemination and communication component in the MHEW mechanism.

2.10. Disaster Risk Communication (DRC)

Disaster Risk Communication is an essential aspect of DRM since it touches upon the interference decisions during the DRMC. Additionally, it shapes individuals' risk perceptions and influences their levels of preparedness and actions in response to disasters [84]. It aims to avoid and reduce disaster damages and losses, alert the general community prior to a catastrophe, propagate information throughout calamities, and assist in the resurgence process [85]. The DRC aims to distribute information regarding disaster risk, repercussions, and how one's behaviour might influence the disaster's outcome [86]. Considering all the scenarios defined in the literature regarding disaster communication, the term Disaster-Related communication denotes 'any kind of information sharing amongst the public in Sri Lanka'. Disaster-related communication between responsible authorities and the general community occurs in all stages of the DRMC, with diverse motivations at each phase [85]. Therefore, it can be concluded that there is a link between the DRC and the different stages of the

DRMC and the related actions. This connectivity is shown graphically in Figure 2-4 [87].

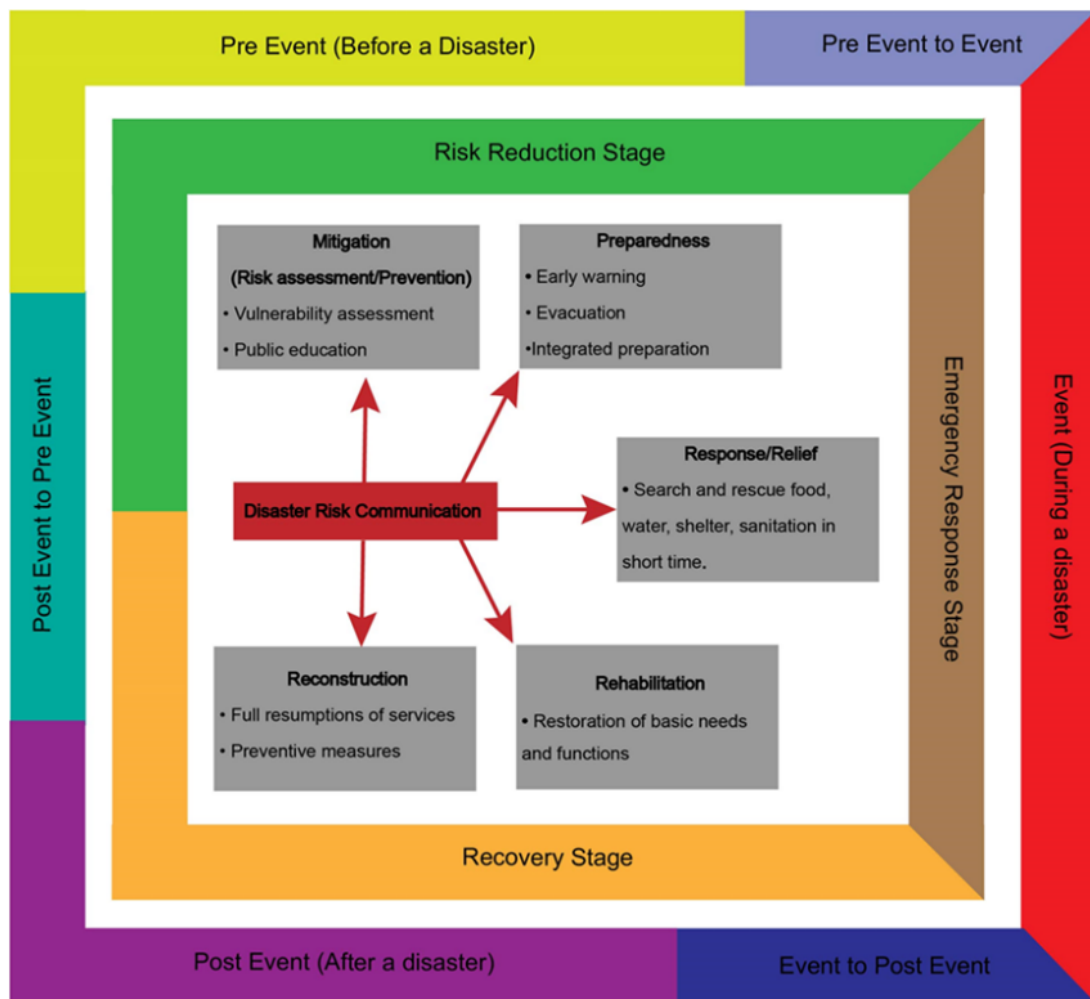


Figure 2-4: The relevance of DRC within the DRM and its cycle is of paramount importance

In disaster-related communication, the quality of the messages is crucial, which offers essential, practical, and useable information. This is necessary for disaster management organizations and communities to adequately plan and respond to protect lives and livelihoods [88]. Subsequently, a high level of reliability of the messages is required in the context of warning dissemination and communication of MHEW. Those in hazard jeopardy may not reply promptly to warnings if the information source cannot be trusted, and sometimes it takes a while to build trust [89]. In order to have an effective disaster-related communication mechanism, timely, accurate, meaningful,

and understandable information should be disseminated to the vulnerable community [90].

Multiple methods must be utilised to guarantee that the alerts reach a wide array of individuals, averting any route of failure and reinforcing the warning message. Disaster-related messages can be spread through various means of communicative channels, including social media, mobile phones, radio, television, sirens, and megaphones [91]. The lack of a robust and streamlined communication system pertaining to disasters between the susceptible population and the accountable governing bodies has the potential to jeopardise public safety and induce widespread panic and disarray [92]. In order to build such a mechanism, numerous types of communication channels are utilized in DRC in various ways [93]. Since communication channels are linked with many of the actions taken during the various phases of disasters, as stated in the DRMC, they play a vital role in DRC, which can help prevent a disaster or reduce its impact [52], [94]. Communication channels, for example, are crucial in Early Warning actions done throughout the DRMC's risk reduction stage of preparedness.

2.11. Communication Channels Used for Disaster Risk Communication

Disaster Risk Communication can take place through a variety of channels, which are the means through which information is passed from sender to receiver [85]. Communication channels play a chief role in the DRMC, assisting in avoiding or mitigating disasters [95]. Their role remains crucial in early warning actions conducted as part of the DRR stage of the DRMC's preparedness as well. Traditional (old media) and modern channels (new media) can be listed as the two types of communication channels that have evolved throughout the years [96]. Both have been used to transmit disaster risk information to the ordinary community and supplementary critical Disaster Risk Reduction and Management participants [97].

2.11.1. Traditional Communication Channels

As previously mentioned, channels for communication can be classified into a pair of main categories: traditional and modern modes of communication [98]. Both have been utilized for transmitting disaster-related information by the ordinary community and the additional pertinent participants in charge of Disaster Risk Management [99]. Mass communication before the emergence of digital media is considered traditional media [100]. In the period preceding the twenty-first century, conventional media played a significant role in disseminating information pertaining to calamitous events [101]. Various traditional communication channels have been used for disaster-related communication in multiple ways [93]. Table 2-3 represents the diverse categories of traditional media classified according to the method of disseminating information [97], [98], [101].

Table 2-3: Different types of traditional media

Traditional Communication Channel	
Printed Media	Newspapers, Magazines, Brochures, Media Advisories
Electronic Media	Radio, Television
	Wired Telephone
	Loudspeakers, Disseminating Messages from Vehicles
	Radio Sirens, Electric Bells
	Internet (World Wide Web)
Human Mode	Chatting among Individuals, Meetings, Team Discussions

2.11.2. Challenges of Using Traditional Communication Channels

By examining historical records of global disasters, a number of obstacles can be discerned in utilising conventional communication channels for disseminating information related to disasters. These challenges arise from various factors, including the escalating frequency and intensity of both natural and human-induced hazards [102]. Various adverse impacts have flowed as a consequence of these challenges, which have considerably impacted the DRC. Table 2-4 presents various challenges in using traditional communication channels for disaster-related communication and their adverse effects on DRC [103], [104].

Table 2-4: Various challenges that encountered in utilising conventional channels in Disaster Risk Communication

Communication Channel		Challenges Faced	Negative Effects
Print	<ul style="list-style-type: none"> • Newspapers • Magazines • Brochures 	<ul style="list-style-type: none"> • Limited time to take the necessary action • Issuing problems due to variations in geographical proximity 	<ul style="list-style-type: none"> • Failure to provide information on time. • Absence of simplified information searching. • Cannot overcome geographic distances
Electronics	<ul style="list-style-type: none"> • Telephone • Radio • Television • Route Alert • Tone Alert • Radio Siren 	<ul style="list-style-type: none"> • Challenge in reaching a high number of vulnerable communities • Power outages due to the severity of the disasters • Destruction of the utility facilities such 	<ul style="list-style-type: none"> • Failure to disseminate information to the last mile properly • The community has to wait a long time to contact relevant responsible persons

		as electricity poles and telecommunication poles	
In-person	<ul style="list-style-type: none"> • Group conversation • Chat between two people 	<ul style="list-style-type: none"> • Provision of accurate information 	<ul style="list-style-type: none"> • Spreading of misinformation and rumours rapidly

When using communication channels for disaster-related communication, they should embody exceptional characteristics compared to when utilized for other purposes [105]. The recognition of the difficulties that arise due to the heightened occurrence of disasters has led to the need for specific attributes in communication channels used for disaster-related communication.

The available resources and the target audience for the particular message determine which channel should be utilized to communicate disaster-related information [106]. Also, there should be specific characteristics in the communication channels used by the Disaster Management Stakeholders to improve the effectiveness of communication: (a) reaching the entire target audience (higher capacity); (b) getting information to the audience when they need it, with the capacity to deliver the message reliably and on a timely basis, while ensuring it has the ability to facilitate quick comprehension of the content of the message; (c) enabling access within resource limitations and effortlessness of practise; (d) strengthening the ability to sharing the real-time information [107]. The Crisis Response and Disaster Resilience 2030 initiative of the Federal Emergency Management Agency (FEMA) has recognised that the emergence of novel and unfamiliar operational scenarios presents intricate challenges for disaster management. These challenges primarily include a rise in the

frequency of disasters, necessitating the analysis of a greater volume of information within limited time constraints. Additionally, the initiative acknowledges the adoption and advancement of new technologies, an increase in the number of contributors, and heightened community expectations as significant factors to be considered [108]. Further, scholars have identified that the traditional Disaster Risk Management approaches are not insufficient to address the new challenges in disaster risk management [109]. Hence, there arose a requirement for innovative strategic approaches to effectively address the complexities inherent in Disaster Risk Management. The utilisation of contemporary communication channels emerged as a global response to the prevailing obstacles within the field of Disaster Risk Management, prompted by the rapid expansion of Information and Communication Technology [87]. Social media was identified as the modern solution that could provide sufficient flexibility and adaptability to enhance communication in Disaster Risk Management [110].

PART II

Part I of the literature review has shown the challenges faced in using the media for communication in disaster situations. Part II of the literature review has primarily shown how technology can be used to overcome those challenges. Existing literature extensively examines the utilisation of social media platforms for communication during disaster situations, providing comprehensive insights into the associated benefits and drawbacks. Moreover, this section presents a comprehensive summary of the literature review that was undertaken regarding the subject of communication in the context of disasters in Sri Lanka. This section focuses on addressing the limitations of current methodologies and exploring the prospective benefits of using social media as a solution to these limitations. The discussion is informed by the findings from the literature review. Moreover, this section addresses the various theoretical aspects that have been utilised by previous research scholars in their studies pertaining to the utilisation of social media throughout calamities. The utilisation of theoretical frameworks can be applied to examine the patterns of contemporary social media utilisation in the context of sharing disaster-related information in Sri Lanka.

2.12. The Integration of New Technology for the Purpose of Disaster Risk Communication

Technological applications can be incorporated with the information-sharing process in emergency response and disaster relief operations with the latest developments. Internet-based applications have become the most efficient and trending information-sharing platforms when it comes to emergency response and disaster information-sharing platforms [111]. Further, mobile and internet-based platforms can be incorporated into real-time information sharing and updating functioning during a disaster [112]. The evolution of technology and internet-based applications is depicted in Figure 2-5 [113]–[117].

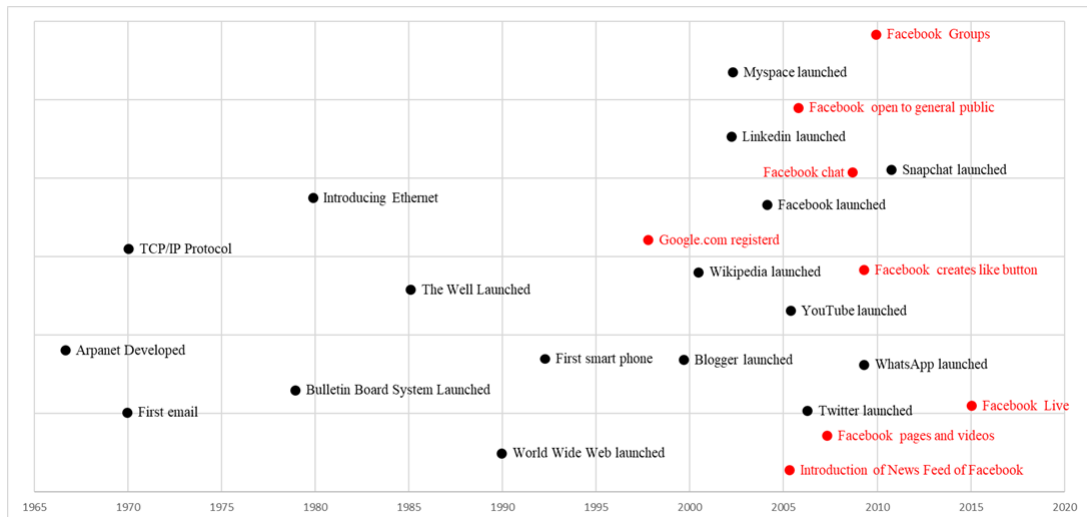


Figure 2-5: Progressive development of innovation of the applications built on internet throughout history (Developed by Author)

2.13. Utilisation of Social Media for Disaster Risk Communication

The term "social media" refers to a wide variety of online programmes and services that are linked to the internet. These programmes and services are categorised as "Web 2.0." [118], [119]. Social media platforms facilitate extensive connectivity among numerous individuals or users, enabling the widespread dissemination of information [120]. The explosive growth of smartphones and other mobile devices has resulted in the emergence of social networking websites, which has increased connectivity among individuals. As a result, current levels of global interconnectedness have been surpassed by these new levels [121]. At the beginning of the year 2020, the total number of people who used the internet around the world surpassed 4.54 billion, representing approximately 59% of the total estimated population of the entire world. Concurrently, the amount of people who use social media platforms on a regular basis surpassed 3.8 billion, which is equivalent to approximately 49% of the total population of the world [122]. The growth of diverse social media platforms and messenger applications worldwide from 2008 to 2019 is depicted in Figure 2-6 [123].

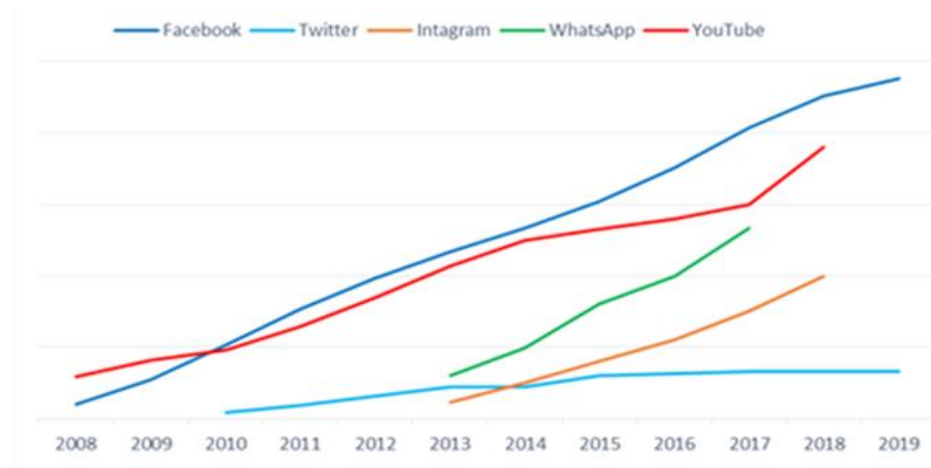


Figure 2-6: The proliferation of global utilisation of diverse social media platforms (Developed by Author)

With the emergence of various challenges and adverse effects, the global community has gravitated towards using the most novel communication channels, adapting to the latest technology [124]. With the widespread diffusion of the internet, people have gained the capability of sharing information easily with a large community without paying any immediate monetary fees simply by posting information on a website or using a social networking service [125]. As an emerging technology, social media has garnered more attention from the general public and responsible authorities in communicating disaster-related information [126]. Previous research indicates that social media is being used to a greater extent during natural disasters, and there is evidence to suggest that social media is the only communication system that is operational during certain catastrophic events [127]. The reason stems from the fact that social media permits the public to share their interpretations in real-time while both victims and authorities may share their worries and remedies in real-time as well. Since a consequence of this, the DRC views social media as an extremely alluring instrument, and as a result, a large number of programmers, academics, scholars, government officials, and businesses have investigated the opportunities it presents [128], [52], [129]. The significance of the role played by social media in a variety of emergency situations has been demonstrated by a large number of studies carried out in recent years. Table 2-5 portrays the utilisation of social media in various disasters worldwide. In each event, the relevant phases of DRMC in which social media had

been used are indicated using the terms: Preparedness, Response, and Recovery. Also, in most research, an outcome has been identified regarding the use of social media in disaster risk management. Table 2-6 presents some of the outcomes that researchers revealed through their studies.

Table 2-5: Numerous instances in which social media platforms have been utilised during times of disasters

Hazard	Year	Used social media	Country	Used phase of the DRMC	Reference
Earthquake	2011	Twitter	Japan (Tohoku earthquake)	Recovery	[130] [131]
	2010	Twitter	Haiti (Haiti earthquake)	Response	[132] [126]
	2010	Microblog	China (Yushu earthquake)	Recovery	[133]
Flood	2010/11	Facebook pages managed by the community groups	Australia (Victoria and Queensland)	Preparedness Response	[134]
	2010/11	Facebook pages managed by the Queensland Police Service	Australia (Victoria and Queensland)	Preparedness Response	[135]
	2009	Twitter	United States of America (Red River Flooding)	Preparedness Response	[136]
	2009/11	Facebook YouTube	Saudi Arabia (Floods in Jeddah)	Recovery	[137]
	2015	Facebook	India	Response	[138]

		WhatsApp	(Chennai Floods)		
Hurricane	2013	Twitter	Philippine (Typhoon Haiyan)	Response Recovery	[139]
	2017	Facebook Twitter	United States of America (Hurricanes Harvey and Irma)	Response	[140]
Tsunami	2011	Twitter	Japan (Great East Japan Tsunami)	Preparedness Response Recovery	[141] [127]
Volcano Eruption	2010	Twitter Facebook	Indonesia (Mount Merapi Eruption)	Preparedness Response Recovery	[142]
	2017	Twitter Facebook	Iceland (Volcano Eruption)	Preparedness Response	[143]
Wildfire	2007	Blogs, Forum, Flickr, Twitter	United States of America (Southern California Wildfire)	Response Recovery	[144]
	2009	Twitter	United States of America	Preparedness	[136]

			(Oklahoma Fire)	Response	
Droughts	2014	Facebook Twitter YouTube	California - United States of America	Response Recovery	[101]
	2012/13	Twitter	United States of America (Drought in Nebraska)	Response Recovery	[145]
Terrorism	2005	Flickr Photo sharing sites	United Kingdom (2007 suicide bomb attack)	Response	[146]
	2008	Twitter Flickr	India (Mumbai Terrorist Attack)	Response Recovery	[147]
	2013	Twitter	United States of America Boston Marathon Bombing	Response	[148]
Violent Crises	2010/11	Microblog (Twitter)	United States of America Johns Hopkins University Hospital shooting	Response	[149]
	2012	Twitter	United States of America (Seattle Café Shooting)	Response	[147]

Table 2-6: Outcomes of prior research investigations that are pertinent to the utilisation of social media during catastrophes

Study	Area of the Exploration	Results	Reference
Looking back and forth in front of conventional media and social media outlets for flood risk communication	This study has explored how effectively the newer forms of technology can inform the community of the potential hazard risks	Age is the most crucial aspect of picking which source (traditional or contemporary media) to obtain risk information	[97]
Disaster management and social media: What role does social media play in disaster preparedness and response for volunteer groups and humanitarian organisations?	This study investigates the role that social media plays in disaster relief, with a particular focus on the roles that volunteer organisations and humanitarian organisations play. This research interest was sparked by a variety of grass-roots initiatives that are utilising social media to implement assistance operations	Social media has been utilised primarily for disaster preparedness (early warning) and disaster response (relief) operations. On the other hand, social media can help increase public participation in strategic preventative planning and recovery planning.	[129]
Twitter and Disasters	The purpose of this research was to determine whether or not users of the popular social media website Twitter preferred to tweet or retweet links originating from traditional media as opposed to social media during the	In most developing nations, though traditional media still occupies a central position, social media is considerably able to occupy an important role in disaster reporting.	[150]

	<p>Pakistan floods that occurred in 2010. In addition, the countries from which these users are tweeting have been researched, and it has been determined whether or not there is a correlation between location and traditional versus social media</p>	<p>Also, information exchanged through social media platforms is considered legitimate.</p>	
<p>Investigating the disaster-related communication in natural hazards: referring to the Queensland floods and Christchurch earthquakes</p>	<p>This investigation concentrated on the use of Twitter, specifically Twitter hashtags, during the Queensland floods of 2010–2011 and the Christchurch earthquakes of 2011 to show patterns of Twitter-based communication during natural disasters and to highlight additional challenges in social media crisis communication research and the practical application of Twitter during future crisis events. The floods in Queensland occurred between 2010 and 2011, and Christchurch was struck by an earthquake in 2011.</p>	<p>Twitter is often referred to as a complement to traditional media as well as other forms of social media. Independent individual users are gaining more significance as their exposure is increased by the repeated dissemination of contributions (through retweeting). The dominance of a small number of primary accounts or hashtags in online communication gives rise to network effects.</p>	<p>[151]</p>

<p>A comparison of the impact of social media on DRC using blogs on the Tianjin Explosion and Typhoon Pigeon on Sina Weibo</p>	<p>In this study, blogs about the Typhoon Pigeon and the Tianjin Explosion were used to conduct a comparative analysis of the network structures of information distributed among various types of disasters. The purpose of this analysis was to determine the impact of social media on various types of disaster risk communication.</p>	<p>The nature of social media in the context of communicating the risk of natural hazards primarily influences the distribution of information, whereas the goal of communicating the risk of anthropogenic hazards is to both transfer information and communicate feelings.</p> <p>Differences in network architecture can give rise to a variety of different functions in social media. During times of natural disaster, the only thing that would be evaluated for risk communication is how accurate the information is..</p>	<p>[152]</p>
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2.14. Use of Social Media by Disaster Management Stakeholders

People are able to express themselves in real time through the use of social media, which is an essential component of disaster risk management because it enables stakeholders to share their information concerning disasters in real time [128]. As well as that scholars have identified that social media can potentially address many of the challenges that have arisen in Disaster Risk Communication, while researchers have directed numerous forms of studies considering the practice of social media by several disaster management stakeholders [153]. The vast majority of researchers have come to believe that social media are able, due to its primary effect on the dissemination of information related to disasters, contribute to a growing engagement of stakeholders who are involved in disaster management in a variety of different ways. Table 2-7 shows some of the instances where social media was used by various stakeholders during significant disasters and the activities, they have executed through them.

Table 2-7: Instances of social media usage by various stakeholders

Stakeholder	Disaster	Activity	Social Media	Reference
Red Cross (NGO)	Haiti Earthquake	People used social media to publish a variety of texts and photographs. The Red Cross collected \$8 million in donations in less than 48 hours.	Twitter	[154]
Police	Floods in Queensland and Victoria in 2011	Disseminated information regarding the river peaks and floods and other information.	Facebook	[134]
Government	2011 June Christchurch earthquake	Sent a coordinated flow of recovery information	Twitter	[127]

		to residents and took remedial action for the misinformation.		
Government	Boston Marathon bombing, 2013	The mayor used Twitter to encourage the community to recover by sharing resources and humanistic communication.	Twitter	[155]

2.15. The Advantages of Utilising Social Media for Disaster Risk Communication

Conventional means of information exchange offer a facility for only one direction of communication, whereas social media offers opportunities for communication in multiple directions between vulnerable communities, the relevant authorities and organisations in charge of disaster management, and those authorities and organisations [52]. Moreover, content developers and traditional media users can distribute information through social media [156]. With this facility, social media has a higher capacity than conventional media, which is helpful for disaster management authorities and organisations in addressing a massive vulnerable community [157], [158]. This will remove disaster-related communication barriers caused by the increasing number of vulnerable communities. Scholars have suggested that increasing the capacity of communication channels assists in overcoming common vulnerabilities and panic during disasters [159].

Social media is vital in situational awareness, as it promotes community understanding of surroundings throughout calamities. Furthermore, the utilisation of social media platforms contributes to the enhanced situational awareness of the community in times of disaster through diverse means of communication. These include the dissemination of information through various mediums such as images, recorded video clips, live streaming, messages by text, and audio recordings, which collectively serve to augment the community's awareness of the prevailing circumstances [160]. Also, social media has great potential to implement data and information on preparedness,

evacuation and rescue coordination, and rehabilitation in diverse ways, such as offering statistical insights into the current progress of disaster and evacuation patterns of vulnerable communities. [161]–[163]. Further, several technical approaches have also been followed for data and information implementations, such as flood precipitation data, official flood inundation maps, river water level graphs, and satellite images. [161], [162], [164].

On the other hand, traditional communication channels usually depend on other utilities and infrastructures, such as electricity poles and telecommunication poles. Also, they generally require considerable space and time to implement their services and are hard to move around [165]. Severe damages are often incurred to the aforementioned critical infrastructures, such as utility poles, during a disaster due to various reasons, such as falling trees and strong winds. As a result, the communication process via traditional channels cannot be achieved successfully [166]. Despite this, social media can still be accessed through portable devices such as smartphones, laptops, and tablets, even in the midst of catastrophic events where these other utilities may be disrupted [94]. Vulnerable communities are increasingly using social media channels to exchange knowledge about preparing for and responding to imminent risks and how to recover after disasters, owing to the prevalence of smartphones and other portable smart devices [167]. By educating the community and generating community worth through rapid communication and information quality, social media networks can assist relevant authorities in developing a robust disaster risk management framework [168].

Applications such as Facebook security assessments, Twitter warnings, Information about COVID-19, and linking people to wellness recommendations and resources specifically developed for disaster-related purposes have been developed by developers of social media platforms to provide a variety of cutting-edge amenities [169], [170]. These features facilitate the actions taken by disaster-prone communities, disaster management authorities and organisations throughout the preparedness, response, and rehabilitation stages of disasters. Furthermore, social media has been engaged more meticulously than ever before with disaster management authorities and

organisations responsible for disaster management (Disaster Management Stakeholders) [61], [171]. With the upsurge in disaster occurrences, the multi-stakeholder approach was illustrated in global disaster management frameworks such as Sendai Framework for Disaster Risk Reduction 2015-2030 [73]. Further, recent researchers have identified that social media plays a paramount role in multilateral Disaster Risk Management by delivering information on neediness, supplying aid and relief, and encouraging the public to involve in disaster-related social activities such as donating, volunteering, contacting available volunteers, and involving them in the rescue operations [172], [173]. Also, many scholars have investigated how government and non-government Disaster Management Stakeholders and communities utilise social media to proactively manage crisis scenarios [151], [174]. Table 2-8 illustrates a selection of advantageous applications of social media during recent calamities, as well as the enhanced advantages of utilising social media as a communication tool in the Democratic Republic of Congo (DRC) in comparison to traditional channels.

Table 2-8: Some of the various advantageous applications of social media in recent global calamities

Disaster	Outcomes and the Conclusions	Reference
H1N1 Pandemic in 2009	<ul style="list-style-type: none"> • According to disease experts, it is a matter of getting where the young audience is- social media helps to reach young people • Sharing information regarding H1N1 through several platforms like YouTube, Twitter, Blogs • Podcasts on the swine flu will be released in six different languages and concentrate on issues that are specific to cultural groups • There were an average of 2,500 visits to the health officials' blogs each day, with some days reaching as high as 8,000 visitors • Posted information as soon as a discovery was made and enabled a two-way conversation 	[175]
2013 Boston Marathon Bombing	<ul style="list-style-type: none"> • In the wake of the bombing at the marathon in Boston, the study analyses the rhetoric that Boston Mayor Thomas Menino posted on Twitter. It looks at how a political leader used social media to communicate during a time of emergency • Social media's importance in helping leaders in times of great uncertainty by offering crucial information and guidance, as well as in starting the healing process and fostering resilience 	[176]

Hurricane Harvey in 2017	<ul style="list-style-type: none"> • 911 and other emergency lines were quickly overwhelmed due to the Hurricane, and people turned to social media for help • Provide emotional support for people in need of rescue • Help those who do not have contact with emergency rescue services • Reach some people that traditional media might not be able to reach 	[177]
Chennai (India) Floods of 2015	<ul style="list-style-type: none"> • This analysis aims to examine the utilisation of Facebook and WhatsApp in the administration of the Chennai floods that occurred in 2015 • Both WhatsApp and Facebook have offered significant and indispensable understanding regarding the needs and demands of the inhabitants • How individuals are affected have gained influence and authority to construct a counter-narrative through social media • The utilisation of both WhatsApp and Facebook has experienced a notable surge, alongside a corresponding increase in the utilisation of conventional communication mediums like radio and television • Facilities are not only for communication tools but also for disaster management during floods 	[178]

2015 Catastrophic Flooding in South Carolina	<ul style="list-style-type: none">• Exploring how libraries can utilise social media to stay in touch with their patrons throughout disasters• Libraries can better assist their users and communities by utilising social media in crisis situations• Contributing to the dissemination of community warning information, providing catastrophe bulletins and volunteer information, and frequently updating their Facebook and Twitter accounts to enable effective communications and involvement with their users during disasters	[179]
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2.16. Background to the Disasters in Sri Lanka

Over the past years, Sri Lanka has experienced a number of significant hazards that have escalated into disastrous events [180]. According to the Sri Lanka Disaster Management Act No. 13 of 2005, it is acknowledged that the populace, infrastructure, and environment within the nation are exposed to various hazards and the subsequent calamities, rendering them susceptible. A thorough examination has effectively identified a total of twenty-one discrete classifications of hazards that have the capacity to escalate into catastrophic occurrences within the geographical confines of Sri Lanka [181]. Within the island nation of Sri Lanka, the predominant hazards include flooding, cyclones, strong winds, landslides, and droughts, which are primarily caused by natural phenomena. Moreover, Sri Lanka experiences notable occurrences of lightning, coastal erosion, fire incidents, and various forms of pollution [180], [182], [183]. Furthermore, there have been documented instances of the spread of diseases transmitted by insects, such as dengue fever and malaria, throughout the entirety of the nation. Furthermore, exacerbating the situation, the recent global outbreak of COVID-19 has expedited these circumstances. In addition, it is noteworthy that tsunamis are classified as a relatively infrequent hazard in Sri Lanka. Nevertheless, the 2004 Indian Ocean Tsunami revealed that the impact of the disaster on the affected country was of paramount importance [184].

According to the Global Climate Index 2019, Sri Lanka was identified as the next most affected country by climate change in the year 2017 [185]. Severe floods and landslides have occurred in 15 of the 25 districts of Sri Lanka due to the southwest monsoon season in May 2017 [186]. Another devastating hazard occurred in May 2016 due to the heavy rain, where 24 districts out of 25 districts had undergone flooding and landslides. The most severe documented landslip in Sri Lanka took place in Aranayaka, situated in the Kegalle district, resulting in the complete destruction of three villages [187].

Furthermore, Sri Lanka has faced numerous hazards in recent years caused totally or primarily due to human activity and decisions that have had a significant influence on

human lives and properties. The occurrence of bomb explosions on the morning of Easter Sunday, specifically on the 21st of April 2019, targeting three churches and four hotels in Sri Lanka, significantly affected the economic condition of the country [188]. Also, a hazard due to human activity was reported at the army camp in Salawa in 2016. In that case, a fire and a sequence of detonations had occurred at an ammunition dump [189], [190]. Further, a garbage mound located in the Kolonnawa area in Sri Lanka crumbled on the 14th of April, 2017, resulting in substantial losses to property and life [191]. Figure 2-7 represents the hazards that Sri Lanka experienced in the past according to the degree of human involvement in each hazard. Some of the severely reported damages and losses for different hazards have been noted in Figure 2-7 under three main axes: Natural to Anthropogenic, Voluntary to Involuntary, and Diffuse to Intense [87].

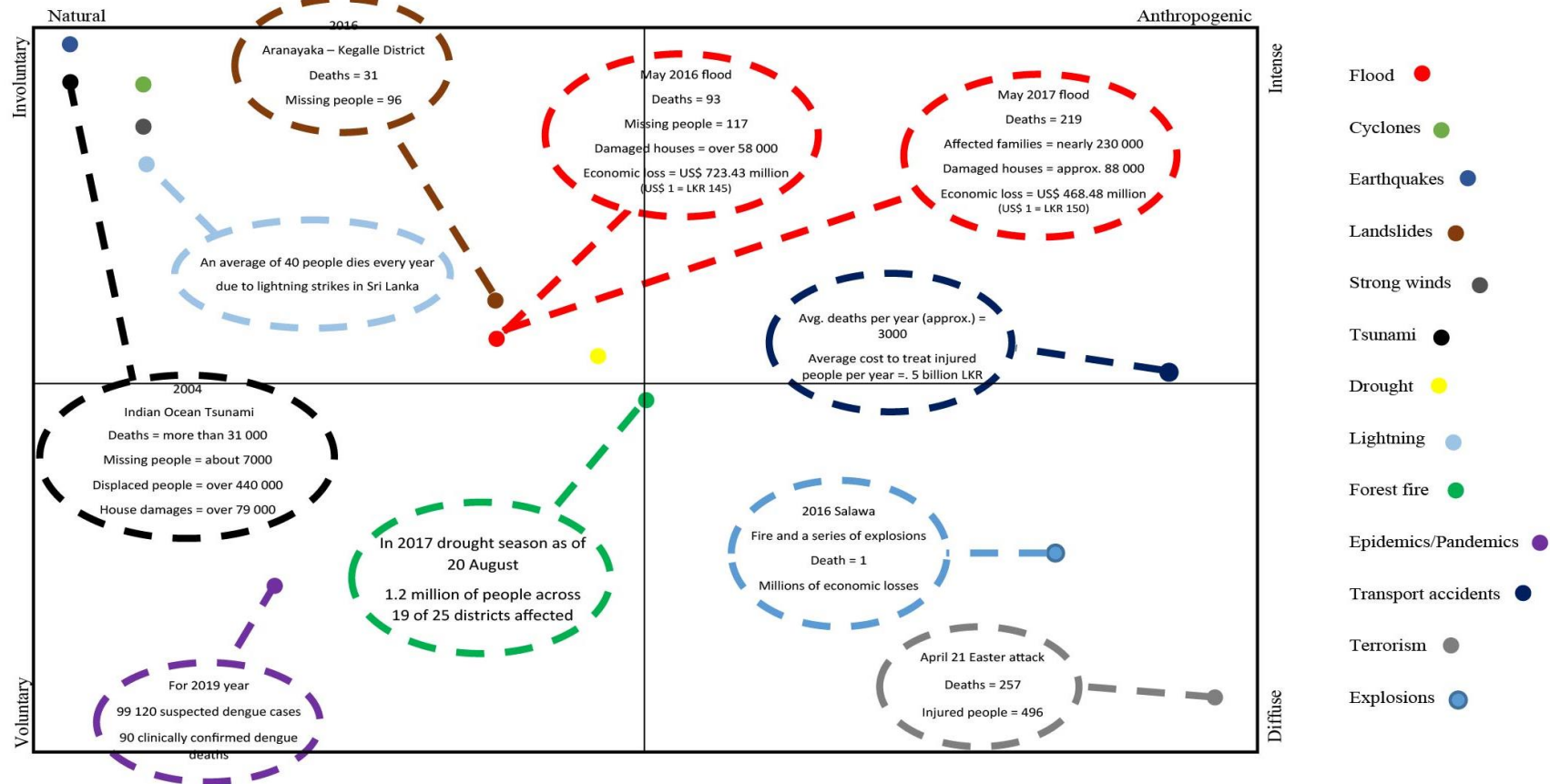


Figure 2-7: Various categories of hazards and corresponding catastrophes that have occurred in past in Sri Lanka (Developed by Author)

2.17. Disaster Risk Management Process in Sri Lanka

Sri Lanka is widely recognised as one of the countries in South Asia that is highly susceptible to natural disasters [192]. Due to various reasons, such as its location in the Indian ocean as a small island, geographic characteristics, and political and ethnic problems, Sri Lanka has experienced various devastating disasters due to natural and man-made hazards over the past years [193]. Sri Lanka Disaster Management Act, No. 13 of 2005, has illustrated the 21 hazard categories that can endanger the community's safety in Sri Lanka [181]. Moreover, as indicated by the Global Climate Risk Index 2020, Sri Lanka has been positioned as the sixth most affected nation in terms of extreme climate change in the year 2018, following its second ranking in 2017 [194]. The Disaster Management Centre (DMC), which operates under the jurisdiction of the Ministry of Defence in Sri Lanka, serves as a leading entity in the field of disaster-related endeavours. The entity is responsible for the coordination and dissemination of early warnings, utilising the assistance of pertinent technical agencies and committees, while ensuring the effective distribution of information to the final recipients [195].

The centralised authority responsible for overseeing early warning mechanisms in Sri Lanka is the Disaster Management Centre (DMC). Along with related technical and other agencies and organizations, the DMC's Emergency Operations Centre has continual contact with all technical authorities in charge of different natural and anthropogenic hazards, which are impending disasters. They notify the appropriate officers for further communication to subnational levels and communities. The Emergency Operations Centre of the DMC has built an excellent early warning system for various calamities prioritizing floods, landslides, tropical cyclones, and storms or sea surges [196]. The Sri Lanka National Emergency Operation Plan (NEOP) is an official document that delineates all the parties involved in the management of disaster risk in Sri Lanka. The Sri Lanka Disaster Management Act, No. 13 of 2005 outlines the identification of responsible stakeholders and their corresponding roles and responsibilities within each hazard category [197].

2.18. Disaster Risk Communication in Sri Lanka

There are several levels in Sri Lanka's current Hazard Early Warning Communication System, including the National, District, Local, Local Government, “Grama Niladhari”, and other specialised divisions [198]. Communication across these levels primarily relies on military and law enforcement communication systems, radio transmissions, a variety of hazards warning towers, and traditional media mechanisms. The DMC has established comprehensive communication channels across the country to promptly inform vulnerable populations [199].

In Sri Lanka, disaster-related communication is primarily used as an Early Warning System, which consists of processes coordinated by national and international authorities [200]. The system includes facts about the risk, a technical observing and warning facility, and the distribution of appropriate cautions to vulnerable communities. According to the NEOP, technological agencies responsible for each hazard category in the Sri Lanka Disaster Management Act are primarily responsible for 24-hour forecasting and predicting each hazard [201].

The Disaster Management Centre plays a crucial role in early warning coordination by collaborating with technical agencies. It serves as a pivotal point of contact to ensure the effective dissemination of warning messages and implementation of appropriate actions to reach the most remote areas [202]. The Emergency Operations Centre of the DMC continues to liaise with all technical agencies responsible for each hazard. It notifies the relevant officials to further communicate to subnational levels and communities about impending hazards [203]. The predominant Early Warning coordination mechanism in the country of Sri Lanka is depicted in Figure 2-8 [201].

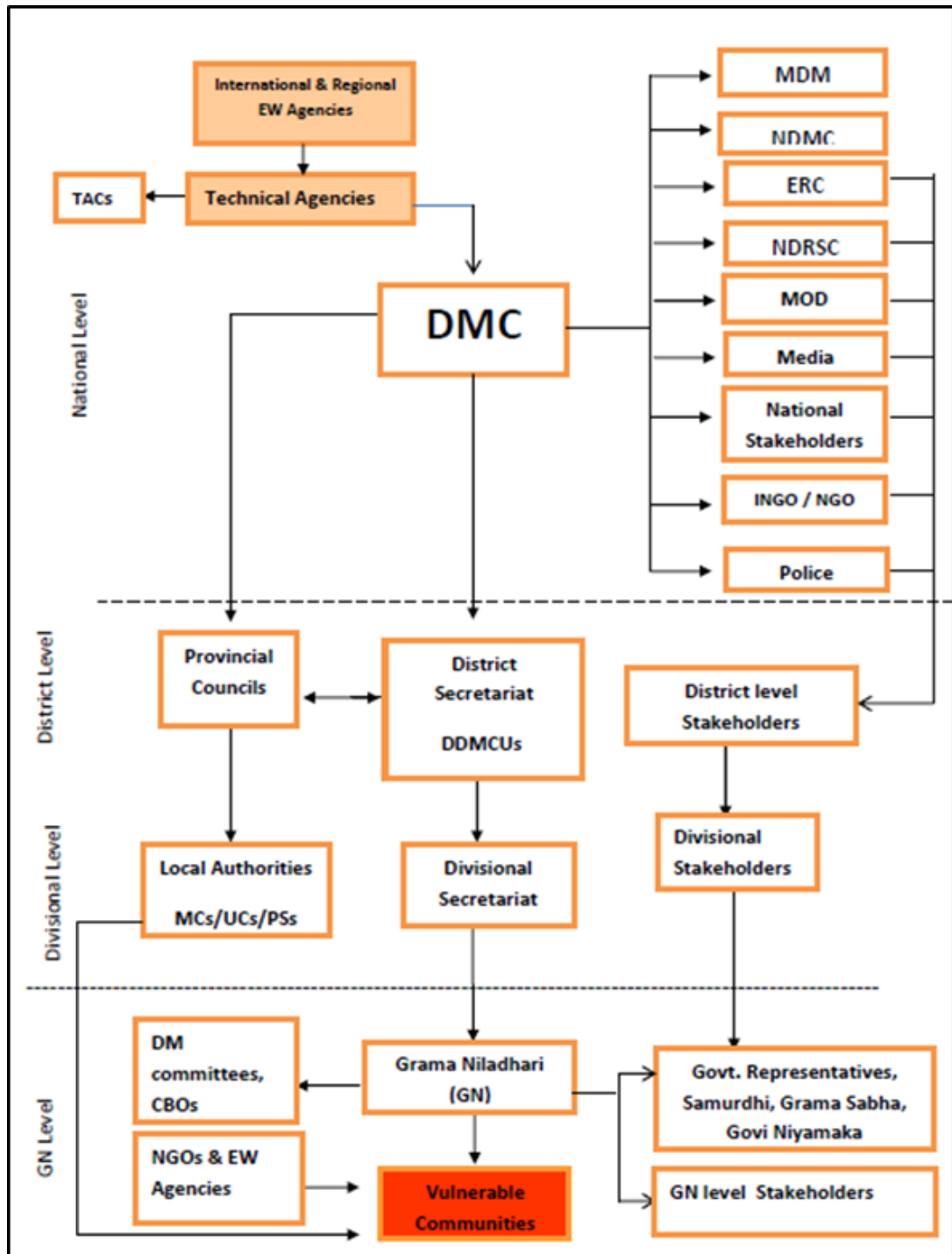


Figure 2-8: The predominant early warning broadcast method in Sri Lanka

The community plays a pivotal role as the primary stakeholder in Disaster Risk Management, given the precarious circumstances associated with a hazard [204]. As shown in Figure 2-8, it can be seen that the Vulnerable Communities are directly connected with only three other stakeholders such as “Grama Niladhari,” NGOs and

EW Agencies, and Local Authorities. It is better to have more stakeholder engagement with the community to get a more extraordinary Disaster Risk Management practice. Consequentially, the efficiency of the disaster-related communication mechanism will be improved, and the community will be more resilient to catastrophic disasters. By implementing this kind of communication mechanism, a community-centred communication mechanism can be developed, as illustrated in Figure 2-9.

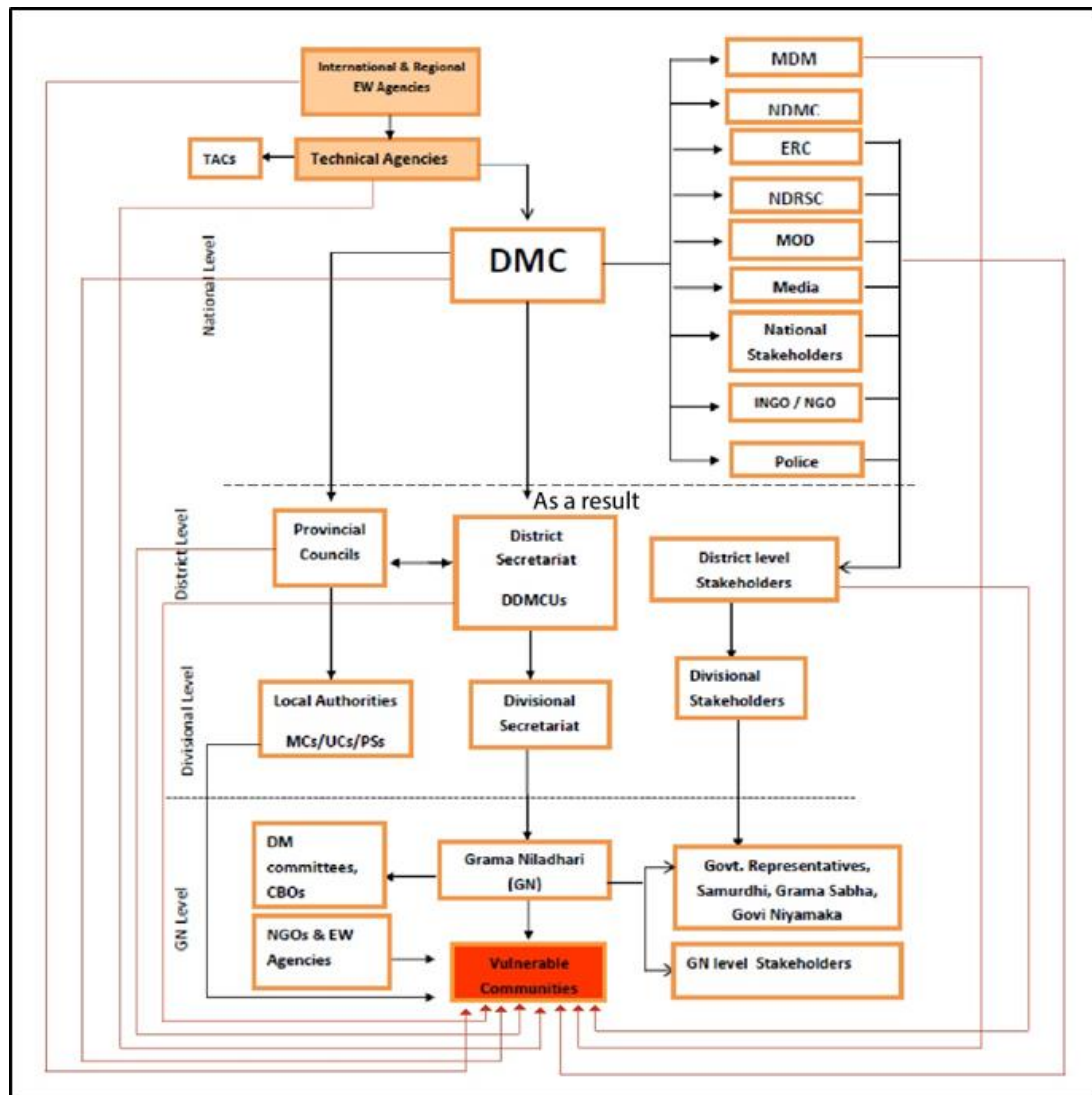


Figure 2-9: Developed Community-Centred Communication Mechanism

By implementing a communication mechanism, it is possible for vulnerable communities to effectively and promptly receive accurate information pertaining to disasters. In order to achieve an efficient communication mechanism that prioritises

the community, it is imperative to establish reliable communication channels that are resilient to potential disasters. The discipline of disaster risk management encompasses the systematic endeavours and tactics utilised to alleviate, anticipate, react to, and recuperate from diverse categories of disasters [205].

2.19. Communication Channels Used for Disaster Risk Communication in Sri Lanka

The DMC is responsible for the dissemination of information regarding disaster risk to the general population across different administrative levels, encompassing national, provincial, district, divisional secretariat, and village levels [206]. Communication is one of the substantial components of DRC in Sri Lanka, which the DMC mainly handles [207]. The communication mechanism established for the Disaster Management Centre (DMC) encompasses various channels through which disaster-related information is disseminated to different segments of Sri Lankan society. These channels include television, radio, early warning towers, sirens, police and military communication systems, SMS alerts, and telephone calls [208]. Further, Print Media, Electronic Media, and In-Person events are common types of media used by Disaster Management Stakeholders in Sri Lanka [96], [97], [101]. There is more likeliness of adopting mobile-based platforms in the early warning vigilance dissemination in Sri Lanka [209]. The Sri Lankan Disaster Management Centre, being the foremost organisation in the field of disaster risk management, utilises a system known as the "Disaster and Emergency Warning Network" (DEWN) for the purpose of disseminating warning messages to the community via SMS. The DEWN system transmits notifications via a secure computer application that allows users to specify the content, geographic scope, and recipients (either individuals or groups) for the message. However, the DWEN initiative proved to be ineffective in terms of facilitating information sharing during the 2016 flood in Sri Lanka, primarily due to its limited geographical scope [210].

2.20. Gaps and Barriers that Exist within the Current Disaster Risk Communication Framework in Sri Lanka

Based on prior investigations [13], it has been noted that the Sri Lankan community has displayed a decreased degree of confidence in the present structure for MHEW across different domains. Firstly, lead-time in delivering information is identified as one of the prominent issues in Sri Lanka to the loss of the community's trust in the MHEW mechanism [211]. Next, several shortcomings in disaster-related communication channels utilized in Sri Lanka form a crucial cause for the existence of this issue. Additionally, the shortage of technological facilities and knowledge among the communities in rural areas in disaster-related communication is another problem, resulting in the loss of the community's confidence in the existing MHEW mechanism. Also, there is a lack of credibility regarding disaster-related information because there are numerous instances of spreading misinformation [212].

Conforming to the evacuation arrangement and people-centred early warning survey in 2018 [213], MHEW information has betrayed confidence in 75% of the defenceless community, and 60% are hesitant to react to early warning announcements, according to new research. The communication mode of warning dissemination has been identified as one of the key factors behind this. Also, from that survey, it was identified that there is a considerable variety of modes of receiving disaster-related information at urban and rural levels. On the other hand, this study too has identified several research outputs that are usefully incorporated into the effective communication mechanism in Sri Lanka. The research output identified aimed to address several deficiencies in the communication mechanisms utilised during the emergency response stage of disasters. These deficiencies include a lack of proper communication mechanisms for sharing disaster-related information, the absence of a common communication platform to coordinate the duties and real-time information-sharing functions of stakeholders, and the absence of a suitable communication mechanism for administrative officers and key personnel to extract, explore, and modify disaster-related information. Additionally, the research sought to adapt existing communication platforms to suit the needs of developing countries in the face of critical disasters and

incorporate technology as a novel and innovative tool for the development of an effective emergency response communication platform.

A separate study has identified deficiencies in the current communication networks that are responsible for establishing a warning system for emergencies in Sri Lanka [214]. Social network analysis has been used in the present research to develop the communication network for early warnings of different hazards in Sri Lanka, and several issues have been highlighted. Out of them, one issue identified is, in Sri Lanka, communication mechanisms associated with some hazards have not emerged highly on many levels: droughts. The network's few affiliated agencies impact this narrow distribution of disaster-related information. Another critical factor furthering Sri Lanka's MHEW mechanism's weak communication network is the high time consumption involved in delivering disaster-related information in situations of drought and likewise. This study was able to reveal the lacuna in linkages with international agencies.

Furthermore, an additional research endeavour has revealed a number of deficiencies within the current MHEW system in Sri Lanka [215]. It denoted that those gaps existed in both authorities and communities. Table 2-9 shows the gaps in authorities and communities identified by that particular study.

Table 2-9: Summary of the identified gaps in the study

Gaps in Communities	Gaps in Authorities
Reluctance to respond	Not approaching early warning to the last mile
Poor awareness	Bottlenecks in communication links
Mistrust on authorities	Absence of clarity and accuracy
Poor connection with the local government units	Duplication of notice
	Poor communication speed
	Lack of prior notice
	Media acting on their own

In a similar manner, an additional scholarly investigation [26] has ascertained the extent of societal confidence in the current MHEW system in Sri Lanka. According to community responses, government agencies such as the Disaster Management Centre, Sri Lanka Police, and the Media were identified as the most reliable entities in terms of effectively disseminating early warning alerts for disasters. Furthermore, the present study has determined that the probability of embracing mobile-based platforms in the distribution of early warning systems is greater in urban areas compared to rural regions.

2.21. The Utilisation of Social Media Platforms in Sri Lanka

Based on the results of a comprehensive nationwide survey carried out by the Asia Pacific Institute of Digital Marketing [216] in Sri Lanka between November and December 2019, it has been determined that social media is widely utilised as a media platform in Sri Lanka. The findings of the survey indicate that the Sri Lankan community is presently utilising multiple social media platforms and messenger applications. Figure 2-11 depicts the typical usage patterns of social media platforms and messenger applications in Sri Lanka during the year 2019 [217]. A survey was conducted in 2019 to assess the feasibility of utilising mobile applications in disaster Early Warning systems within the Sri Lankan context. The survey was administered alongside the 10 GN divisions ("Grama Niladari") in Sri Lanka, and a total of 323 responses were collected for the purpose of analysis [112]. Based on the results of the survey, a significant proportion of the participants (68%) indicated that they have refrained from utilising any social media platforms. On the contrary, a notable minority (32%) expressed their consistent involvement with social media platforms.

Moreover, upon analysing the respondents' frequency of using Facebook and Twitter depending on their age class, it can be observed that there is a low usage of Twitter in Sri Lanka than Facebook. Furthermore, this study has observed that social media usage in the country decreases with the increase in age, which means that there is higher utilization of social media among the younger generation than the elderly generation. The community's response to the questionnaire regarding the most efficient ways to obtain early warning information for disasters is shown in Figure 2-10 [213], [218].

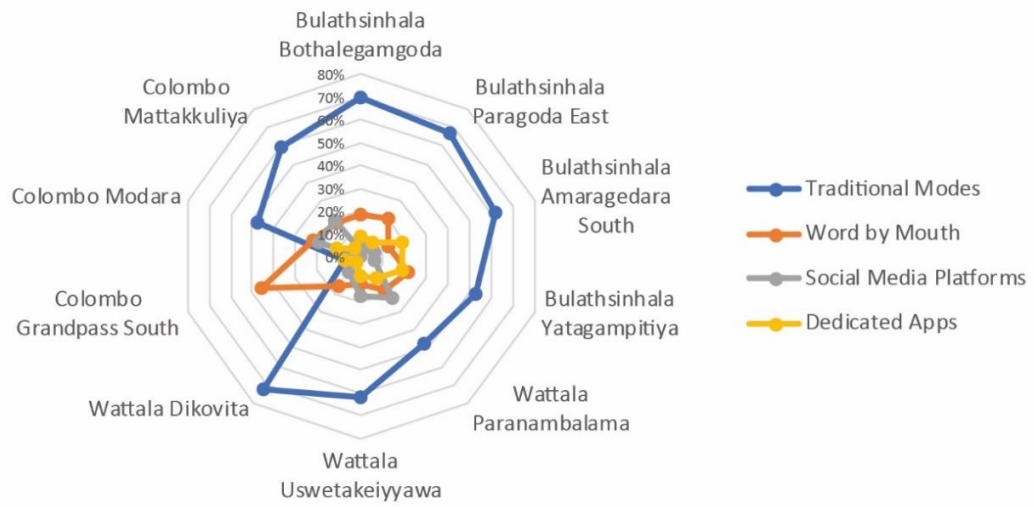


Figure 2-10: The findings derived from the questionnaire conducted in the year 2019

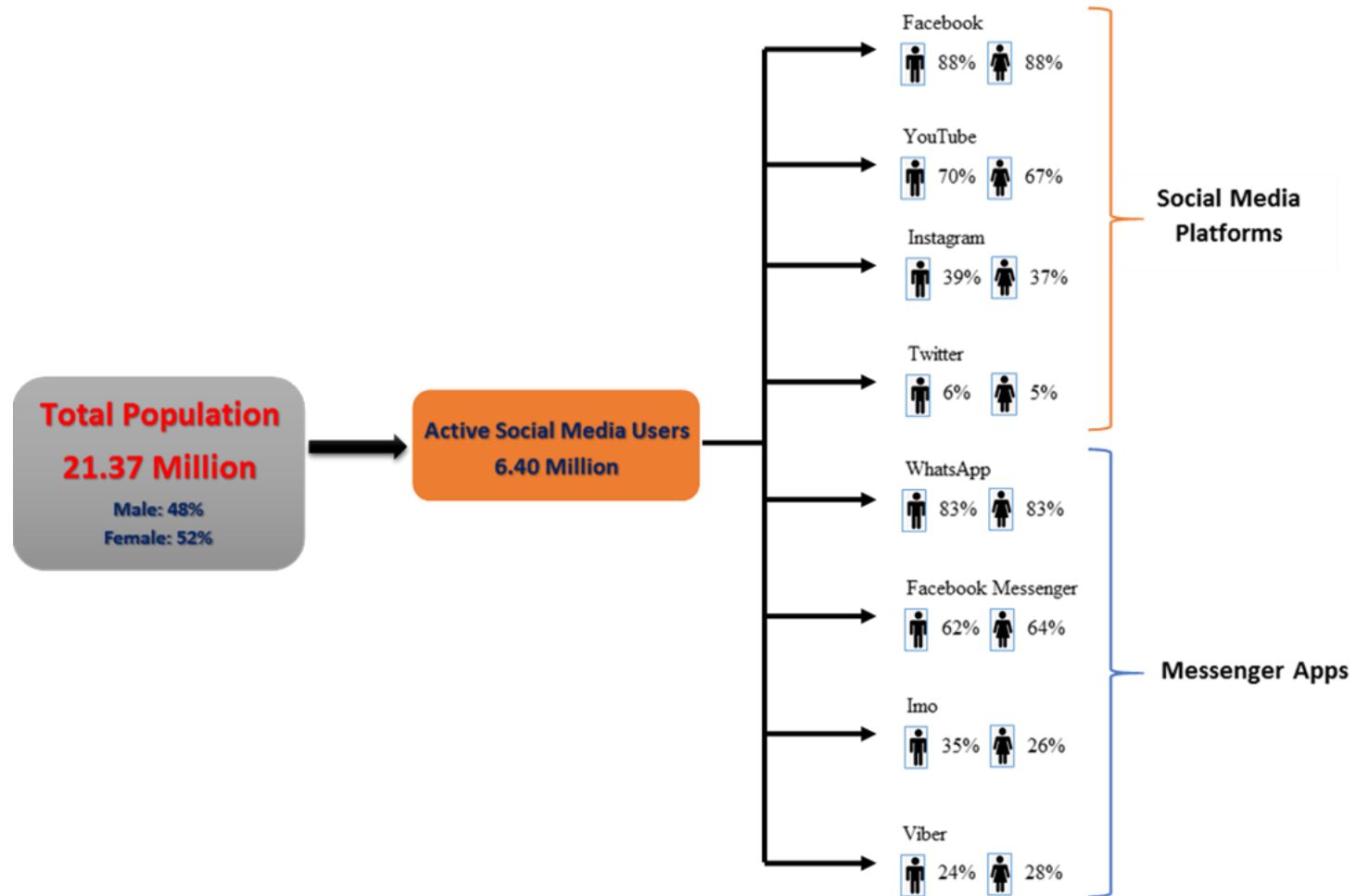


Figure 2-11: How social media platforms were used in Sri Lanka in 2019 (Developed by Author)

2.22. The Utilisation of Social Media Platforms for Disaster Risk Communication in Sri Lanka

Due to the general public's extensive use of social media in Sri Lanka, there is an increasing tendency to use these platforms for discussing and sharing information about various disasters [219]. However, a thorough review of the literature suggests that there is a dearth of previous studies concerning the implementation of social media platforms promoting information sharing in times of a catastrophe, particularly in Sri Lanka. According to one of those few studies, Facebook is essential for communication in Sri Lanka both during and after the catastrophe [206], [220]. Nevertheless, it also discovered that there was a greatly constricted practise of using Facebook during the pre-disaster phase [206]. Another study has revealed that, although social media is 'widely' utilised in Sri Lanka, there is a failure in its 'effective' utilization in the Sri Lankan DRM [221]. The research revealed a diverse range of advantages that can be attained by effectively utilising social media platforms during times of crises in Sri Lanka. The emergence of instantaneous interaction has resulted in a notable reduction in the duration between the expectation and acquisition of information. This has greatly facilitated real-time communication and enabled the connection of large communities in a shorter span of time. Additionally, it has created opportunities for individuals to provide and receive assistance in a timely manner [221].

Facebook was the most widely used social media platform for information dissemination during the May 2016 floods in Sri Lanka [206]. The dissemination of relevant information and updates regarding the COVID-19 pandemic in Sri Lanka has been greatly aided by the use of social media [222]. A wide range of stakeholders, including news media, community organisations, influencers, and academics, have created numerous Facebook pages, Facebook groups, and WhatsApp groups as means of sharing updates and information about COVID-19. This study's main goal is to investigate how the Sri Lankan community uses social media to spread awareness about the dangers of disasters across the

nation. Improving disaster-related social media practises is considered crucial in this regard.

Based on the literature examined, it is reasonable to assert that the utilisation of social media as a medium for DRC in Sri Lanka holds significant potential. The research brings into light unique gaps and challenges in using social media for DRC around the world, which can, in turn, be used to improve and develop social media use for disaster risk communication in Sri Lanka. It is noted that according to various studies, the use of social media for Disaster Risk Communication has been shown to require an embodiment of a variety of characteristics.

Due to the limited studies conducted regarding this field, this research is conducted in order to properly investigate the current use, challenges, and benefits associated with using social media dedicated to communication regarding the disasters in Sri Lanka. To achieve these ends, the data collection and analysis methods identified and proposed by a previous study were adapted [223].

2.23. Various Study Approaches that are Employed to Analyse the Social Media Networks that Emerge During Disasters

The use of social media for disaster-related communication has been the subject of more academic research as a result of social media's widespread use worldwide [224]. Most previous research viewpoints have focused on the different ways that social media platforms have been adapted for use in disaster catastrophe and emergency communication. Usually, organisations that are governmental, non-governmental, or charitable are the ones that investigate these adaptations [225], [226]. Table 2-10 presents some key study approaches followed, germane to social media and its use in disaster-related communication identified through the literature review.

Table 2-10: Numerous research methodologies have been employed on a global scale to investigate the utilisation of social media during times of calamities

Study	Approach	Reference
The use of social media in disaster situations: framework and cases	The user has presented a novel framework for social media that comprises four fundamental modules: decision-making, facilitating, contemplation, and accumulation.	[227]
Social media and disasters: a functional framework for social media utilising in disaster planning, response, and research	The researcher devised an extensive framework for the creation of social media tools aimed at mitigating the impact of catastrophes. Additionally, the researcher established systematic procedures for the implementation of social media strategies during disaster situations. Furthermore, the researcher conducted empirical investigations to examine the effects of social media usage in the context of disasters. The framework illustrates the diverse array of stakeholders who can both generate and utilise catastrophic social media content.	[52]
Social- mediated crisis communication (SMCC) model	This theoretical structure elucidates the dynamics of information dissemination and interconnections among diverse media platforms,	[228]

	encompassing both digital and traditional communication channels, organisational entities, and their impact on public perception in times of crisis	
Social media and the virality of risk: The risk amplification through media spread (rams) model	The Risk Amplification through Media Spread (RAMS) model provides a comprehensive framework for understanding the mechanisms by which messages are disseminated and risks are amplified through communication channels, particularly in the context of social media. This model sheds light on the growing challenges faced by media managers in effectively addressing and managing Infectious Disease Outbreaks (IDO).	[229]
The attributes of online social networks in the aftermath of a disaster, as delineated by social network analysis	Using Social Network Analysis to transform social media data into knowledge provides insights into social media's vital role in emergency information dissemination.	[230]
A structural approach to the social positions and repercussions of utilising social media in disasters	Provides intellectual and empirical perspectives on how social media in disaster management aids disaster management and reinforces the responsibilities of diverse stakeholders.	[231]

2.23.1. Social Network Analysis and its Applications

Based on a previous study [208], social media refers to communication technologies that facilitate interactions between social actors through dyadic relationships. In recent years, the examination of these relationships has become a fundamental aspect in the process of making decisions pertaining to the community network established via social media. In order to accomplish this, Social Network Analysis (SNA) has been employed as the principal analytical instrument over the past decade [209]. Social Network Analysis (SNA) is a sociological methodology employed to examine the relationships and connections among social actors with the aim of revealing the fundamental social structures that exist beneath the surface [210]. The primary focus of this study lies in the examination of social relationships from the lens of network theory. This theoretical framework employs the concepts of nodes, which represent individual actors within the network, and edges, which denote the distinct relationships that exist among friends, family members, organisations, and sexual partners. Social network diagrams often represent networks using nodes (dots) and edges (lines) [209]. There are multiple instances that demonstrate the utilisation of Social Network Analysis (SNA) in the examination, visualisation, and understanding of the worldwide communication networks established through social media platforms in times of calamities. Social Network Analysis (SNA) has been employed in numerous research studies across various disciplines, as evidenced by the comprehensive compilation presented in Table 2-11.

Table 2-11: Numerous investigations conducted on the utilisation of social media during disasters, employing Social Network Analysis (SNA) methodologies.

Study Name	How SNA has been Used in the Study	Reference
The utilisation of Social Network Analysis (SNA) for the purpose of discerning the attributes of online social networks subsequent to a catastrophic event	Understanding Louisiana's social media networks' characteristics during emergency reactions by using Social Network Analysis (SNA)	[230]
Research on Hurricane Harvey in Houston revealed a temporal network analysis of inter-organizational communications on social media during disasters	Analysing social media communication networks between organisations to identify organisational roles and situational information communication	[232]
Disaster response efforts undertaken during the 2014 Chiangrai province earthquake, employing a social network analysis approach	In Thailand, social media and earthquake preparedness are being investigated at all levels of government, from local to state	[233]
Adaptation of Social Network Analysis (SNA) to recognise communication network cooperated with Multi-Hazard Early Warning (MHEW) in Sri Lanka	Analysing the performance of stakeholders' communication networks during emergency catastrophe readiness and reaction stages	[214]

<p>Data mining on social media platforms: analysis of tweets during the Australian floods that occurred between 2010 and 2011, employing social network analysis techniques</p>	<p>Utilizing SNA, researchers were able to examine how Twitter users interacted with one another throughout Australia's 2010–2011 floods and pinpoint key figures in the online communities that formed in Queensland, New South Wales, and Victoria</p>	<p>[234]</p>
<p>Using social network analysis to analyse public needs and interest in health policies on a government Facebook fan page</p>	<p>Applying SNA to analyze the relationships between organizations, laws, and public interest</p>	<p>[235]</p>
<p>Social Network Analysis Adapted for Marketing: An Examination of a Product's Facebook Page Case Study</p>	<p>This discussion emphasises the significance of social network analysis (SNA) and graph theory in the identification of patterns, connections, and interactions among consumers. It further explores the impact of these methodologies on marketing decision-making, networking analysis planning, and their practical implementation</p>	<p>[236]</p>

2.23.2. Sentiment Analysis and its Applications

Sentiment analysis is a form of contextual text mining that helps to better understand the social sentiment of online discussions by identifying and extracting personal information from the source material. On the other hand, sentiment analysis and count-based metrics make up the bulk of social media stream analysis. This is comparable to only having scratched the surface of a treasure trove and losing out on valuable discoveries that are still hidden [237]. Sentiment analysis is a Natural Language Processing (NLP) technique that involves identifying and classifying textual sentiments. The most often taken into account categories are "positive," "negative," and "neutral," along with other more granular ones like "very positive" and "very negative" [238].

On social media, users can hold public discussions on their user accounts. These interactions may be available to all Internet users or restricted to a select group of users, depending on the privacy settings. People can use Social Media to express their daily highs and lows, share life events, create new friendships, and maintain contact with old ones. These actions can be carried out via messages, likes, posts, comments, photographs, and videos. The majority of these exchanges are filled with simple or complex emotions. Emotions are a complicated condition of sensation consequential in physical and emotional variations that directly influence human thought and performance. Words like joyful, sad, furious, depressed, love, and hate can express emotions.

In this study, emotions in comments on the posts on a Facebook page published by social media influencers dedicated to disaster-related information were analysed. Through this analysis, extracted textual data can be represented and understood evocatively. Numerous techniques can be used to analyse the textual data. Sentiment analysis allows researchers to follow conceits and emotions from posts and comments.

Sentiment analysis can be used to monitor how the public feels about certain disaster-related information that has been shared on social media. This information can then be analysed to determine whether or not the relevant information is viewed favourably by

the public. Feedback on the material released can then be obtained. This feedback can be used by researchers and social media influencers to improve the way they share information about disasters on social media. It's also useful to find out how non-influencers, or general social media influencers, communicate with one another. Sentiment analysis requires mining relevant text from the internet using a web scraping tool. After that, the text must be closely examined to find any sentiment. Typically, this is accomplished by searching a set of lexicons for a given set of terms, or by using pre-trained classifiers like the Naïve Bayes algorithm or Support Vector Machines (SVM).

The literature demonstrates sentiment analysis for data sets taken from various social media platforms, including Facebook and Twitter, and identifies a number of prior studies. An overview of some of the earlier related works is shown in Table 2-12.

Table 2-12: Previous research that focused on the application of sentiment analysis techniques to social networks

Year	Description of the Research	Used Techniques	Reference
2014	Using Facebook status posts to find out how people feel about E-Learning	Lexicons and machine learning techniques	[239]
2014	Extracting personality characteristics from the data on Facebook	Machine learning classifiers based on a five-class model to predict Facebook users' personalities	[240]
2014	Investigating the social relationships between Facebook users using sentiment analysis techniques.	Analysed what a particular person talks about in real-time, whom they talk to the most, who they commonly agree with, and who they are constantly in conflict with	[241]
2015	Some examples of how politicians use Facebook? A Social Observatory in Action	Political Facebook comments were analysed to identify the historical, current, and future levels of optimism	[242]
2012	Twitter audience sentiment analysis: determining the positive or negative influence of popular Twitter users	Established sentiment analysis tools to look into how well-known real-life individuals affect their Twitter followers in order to better understand the emotional impact of their tweets	[243]

2014	Subjects, Societies, and Interactions on Climate Change on Twitter: The 2013 IPCC Working Group 1 Report	Investigates the responses of individuals to climate change posts made by other users on the social media platform Twitter, specifically focusing on tweets related to the International Panel on Climate Change	[244]
2015	The popularity of the iPhone 6 in seven distinct locations in the United States studied using Tweets	A method for analysing and interpreting Twitter data in order to assess community opinions, which was tested on Tweets concerning the iPhone 6	[245]
2015	Intelligent Topical Sentiment Analysis for E-Learner Classification and Their Interest Topics	Introduces a novel approach known as the Bigram Item Response Theory (BIRT) and provides empirical evidence supporting its superiority over established methodologies in the realm of sentiment extraction from Twitter data	[246]

2.23.3. Structural Equation Modelling and its Applications

A collection of statistical models that examine relationships between independent variables is called Structural Equation Modelling (SEM), which can be continuous or discrete, with one or more dependent variables which can be continuous or discrete [247]. Independent and dependent variables can be factors or variables that can be assessed. This methodology integrates both component analysis and multiple regression analysis to investigate the underlying relationship between observable and unobservable variables. This method is employed by researchers due to its capacity to facilitate the estimation of multiple interrelated dependencies within a singular investigation [248]. Endogenous and exogenous variables are the two types of variables considered in this study. Endogenous variables are dependent on the same thing as the independent variable. SEM is also known as casual modelling because it tests the postulated informal linkages [249]. The following assumptions are taken into account when conducting SEM analysis [250]. The maximum likelihood method is utilised and assumed for the multivariate normal distribution. Slight deviations from multivariate normality can lead to significant disparities in the chi-square test. The concept of linearity posits that there exists a linear relationship between endogenous and exogenous variables. Anomalies: The presence of any outliers within the dataset should be avoided. The presence of outliers can significantly affect the statistical significance of the model. The sequence of events is characterised by a causal relationship between endogenous and exogenous factors, where the cause precedes the effect.

Path analysis was created to break down correlations into smaller components to interpret effects. Multiple regression is strongly related to path analysis. Thereby, it could be stated that the regression is a subset of path analysis. Some scholars refer to path analysis and similar techniques as "causal modelling." The nomenclature is derived from the observation that these methodologies enable the validation of theoretical causal claims while keeping variables unchanged. The term "causal" pertains to an assumption made in a model, rather than being indicative of the quality of the output or the outcome of a technique. In the context of assuming causal

relationships between certain variables, various methodologies are employed to examine and evaluate hypotheses concerning these variables [251].

In path analysis, there are customs concerning how items are displayed and named. The arrows indicate supposed causal relationships. A single-headed arrow indicates the relationship from cause to effect. The presence of a curved arrow featuring two heads indicates that there exists a correlation between variables, without assuming any causal relationships. Exogenous variables are the independent variables denoted as X, while endogenous variables are the dependent variables denoted as Y. The path coefficient is used to demonstrate the direct impact of an assumed causal variable on another variable assumed to be its effect. The calculation of path coefficients involves the use of correlations and subsequent standardisation [252]. This study's path was based on the following assumptions [253].

- All of the relationships are additive and linear. The path diagram depicts the causal assumptions (what causes what).
- The residuals (error terms) are unrelated to the model's variables and one another.
- It is a one-way causal flow.
- Interval scales or better are used to measure the variables.
- The variables are accurately measured (perfect reliability).

CHAPTER 3: RESEARCH METHODOLOGY

The primary aim of the current study was to examine the utilisation of social media in the context of disasters in Sri Lanka. To accomplish this objective, a comprehensive methodology was devised. Therefore, methodology steps have been developed based on the sub-objectives which were defined in the previous section of this study. Figure 3-1 clearly illustrates the flow of the methodological steps used for the present study and how each objective has been achieved by the methodology. Also, it shows the way of data flows from one objective to another. The methodology steps followed to achieve each sub-objective for the present study have been described below in a detailed manner under each sub-objective.

3.1. Sub Objective 01 - Identifying the Stakeholders at Different Levels

The literature review undertaken in this study has identified various stakeholders who have utilised social media platforms for diverse objectives during past global catastrophes, primarily to disseminate information pertaining to the respective calamities. The various stakeholders identified in this way were classified under several categories, and several main groups using social media in disaster situations were identified as the leading Disaster Management Stakeholders. Moreover, this study investigates the primary responsibilities assumed by stakeholders when utilising social media platforms during disaster events, as well as the mechanisms through which disaster-related information is exchanged among these stakeholders via social media. This examination takes into account real-world scenarios and case studies from various regions worldwide. As a result, a comprehensive analysis was conducted to assess the efficacy of the prevailing early warning system and the utilisation of social media platforms in Sri Lanka. This evaluation led to the identification of multiple stakeholders who possess remarkable capabilities to effectively integrate social media into their ongoing Disaster Risk Communication efforts in the country. A study was conducted to assess the degree of compatibility between stakeholders utilising social media platforms for disseminating disaster-related information in Sri Lanka and stakeholders employing similar social media practises at the global scale.

3.2. Sub Objective 02 - Identifying the Ways to Use Social Media

The literature review revealed several methods by which social media can be utilised for Disaster Risk Communication, drawing from the analysis of social media usage during past global disaster events. The social media practises can be categorised into various types. The Disaster Risk Management Cycle comprises distinct phases of a disaster, specifically the pre-disaster phase, the during-disaster phase, and the post-disaster phase. The aforementioned phases are recognised as the principal categorizations for social media practises, as elucidated in extant scholarly works. Hence, the literature review has identified various methods by which social media can serve as a communication tool throughout each stage of the disaster risk management cycle. The enhancement of Disaster Risk Communication efficiency was also observed through the implementation of these practises. The literature review revealed a multitude of relationships among social media practises. The study acknowledged the observed relationships between various users of social media throughout each phase of the Disaster Risk Management Cycle. Furthermore, this study identified the relationships between various social media practises that were categorised according to different phases of the Disaster Risk Management Cycle. Furthermore, a multitude of varied relationships were discovered between the utilisation of social media practises and the individuals or groups who engage with them. The relevant literature was consulted in order to assess the suitability of the identified social media practises within the specific context of Sri Lanka. The present analysis considered the extant protocols employed in the ongoing communication practises conducted during instances of calamities.

3.3. Sub Objective 03 - Identifying the Critical Parameters

In order to achieve the primary objective of the present study, it was expected that a framework would be developed and subsequently employed for the purpose of analysis. The framework primarily focuses on stakeholders who utilise social media as a means of communication, particularly in the context of disaster situations. It examines the various applications of social media as a communication tool in these scenarios. To construct the aforementioned framework, it is imperative to ascertain

diverse pivotal parameters pertaining to social media users and the practises associated with disasters. Hence, by conducting a comprehensive review of the literature, this study has successfully identified the users and various methods of utilising social media during times of disasters. Additionally, several crucial parameters associated with these users and methods have been identified. A comprehensive examination was undertaken via a literature review to ascertain the viability of utilising the identified parameters for analysing the utilisation of social media in disaster-related communication within the context of Sri Lanka.

3.4. Sub Objective 04 - Development of the Framework

The initial phase of developing the framework chapter involved the acquisition of knowledge pertaining to stakeholders and the utilisation of social media for Disaster Risk Communication. This knowledge served as the foundation for the subsequent development of a conceptual framework. As previously stated, the current study identified the pertinent stakeholders and practises as "users" and "uses" of social media within the framework of Disaster Risk Communication. The framework was initially developed using the entities that were identified. Moreover, as previously mentioned, a research study was conducted to evaluate the suitability of the identified parameters within the specific context of Sri Lanka. The objective of this study was to assess the viability of implementing an improved framework for analysing the use of social media in disaster-related communication in Sri Lanka. In order to augment the comprehensiveness of the framework regarding the utilisation of social media for Disaster Risk Communication within the specific context of Sri Lanka, an expansion was carried out. The basis for this expansion was rooted in the analysis of the interconnectedness between the individuals who utilise social media and the purposes for which they use it. Additionally, it involved the identification of crucial factors that were derived from previous academic research. As previously stated, a functional integrated framework was developed to examine the utilisation of social media in the context of disasters in Sri Lanka. The framework that was developed was presented to experts in Disaster Risk Reduction, Disaster Risk Management, and Disaster Risk Communication. It was then modified and validated based on their comments and

suggestions. The framework that has been developed presents a comprehensive analysis of the potential mechanisms that can be utilised for leveraging social media platforms in the context of Disaster Risk Communication in Sri Lanka. In order to accomplish the primary objective of this study, the subsequent sections of the study were formulated by taking into consideration the identified parameters and components of the framework. Moreover, considering the study's specific boundaries and constraints, subsequent sections of analysis focused solely on investigating the behavioural patterns of stakeholders, particularly users, who demonstrate a notable inclination towards utilising social media platforms for the objective of Disaster Risk Communication in Sri Lanka.

3.5. Sub Objective 05 - identification of the connectivity among the stakeholders

The potential connectivity of the disaster management stakeholders through social media platforms was identified for the Sri Lankan scenario, considering the standards and protocols. Due to the scope limitation, the case study approach was used for this section by selecting the government organization that used social media in the epidemic hazard category.

Since this study was carried out during the coronavirus outbreak, special attention was paid to the COVID-19 pandemic. National Emergency Operation Plan (NEOP) was used to identify the general behaviour of the different government organizations, such as the connectivity of each government organization and their roles and responsibilities during an epidemic hazard. Social Network Analysis method was cast-off to map the link built in this way, and open software named Gephi was used to visualize that network. Centrality parameters were used for the analysis.

A thorough inspection of social media was conducted to identify how government organizations used social media during a pandemic. The connectivity of each government organization via social media in an epidemic was identified by considering the specific activities of those organizations done on social media. That network was mapped using Social Network Analysis method, and Gephi software was used to visualise it. Centrality parameters were obtained for the analysis.

3.6. Sub Objective 06 - Examining the utilisation patterns of stakeholders on social media platforms

Labelling the current social media usage by the different stakeholders for Disaster Risk Communication is essential to explore the development of that practice in Sri Lanka. Therefore, the current use of social media stakeholders was analysed based on the identified parameters and components from the framework. The primary objective of this analysis was to identify and examine four key stakeholders who play a significant role in the utilisation of social media for Disaster Risk Communication in Sri Lanka. These stakeholders were identified based on an established framework. Those stakeholders are non-influenced general community (individuals), government disaster management stakeholders, social groups, and social media influencers. A variety of analysis techniques and data collection methods were employed to examine the present patterns of utilising social media for Disaster Risk Communication in Sri Lanka.

A web-based survey was created with the aim of reaching the non-influenced general population, a group that is particularly susceptible to the adverse effects of disasters. The survey was distributed to the community through various online platforms, and data was gathered for subsequent analysis. Additionally, a telephone survey was conducted in order to ascertain the behaviour of a particular community in Sri Lanka with regards to their utilisation of social media platforms during times of disasters. Various analytical techniques, including multivariate regression analysis, chi-square analysis, the relative ranking method, and Garrett's ranking technique, were employed to analyse the data collected from the survey respondents. The outcomes of the current social media practise by the non-influenced general community in Sri Lanka for Disaster Risk Communication were derived from the analysis results.

This section of the study aims to provide a detailed analysis of the examination conducted on the utilisation of social media platforms by government disaster management stakeholders for the purpose of facilitating communication related to disaster events. The first stage of the study consisted of identifying various stakeholders who represent government agencies in Sri Lanka that currently utilise

social media platforms for disaster-related communication. Consequently, a comprehensive examination was undertaken on various social media platforms to assess the effectiveness of utilising social media during times of disaster by identifying relevant government entities, as previously indicated. To conduct the inspection, the necessary data was obtained from social media platforms using the Facepager software and the application programming interfaces (APIs) provided by social media developers, specifically Meta. The research centred on the analysis of four key Facebook pages managed by critical government-affiliated disaster management stakeholders in Sri Lanka, while considering the constraints inherent in the current study. The application of Social Network Analysis was utilised to illustrate the behavioural patterns demonstrated by individual Facebook Pages.

Additionally, a study was undertaken to examine the behavioural patterns associated with the utilisation of social media platforms for communication regarding disaster events among various social collectives. The examination of social media usage among social groups was conducted by analysing global case studies identified through a comprehensive literature review. The majority of case studies rely on data obtained from the development and maintenance of social media platforms, such as public Facebook pages or groups, by global community groups. Consequently, a Facebook page and a WhatsApp group were established and administered with the purpose of assessing user behaviour within social groups in Sri Lanka in terms of disseminating disaster-related information through social media platforms. The data utilised in this analysis to examine the present condition of social media usage among Social Groups for disaster-related communication was obtained via a telephone survey, online questionnaire, and insights data acquired from Meta Developers (Facebook Developers). The investigation of social communities involved the utilisation of diverse statistical analytical methods and Social Network Analysis (SNA) techniques.

Furthermore, a research investigation was undertaken to examine the utilisation of social media platforms by individuals with significant online influence, known as social media influencers, for the purpose of disseminating information pertaining to disasters to their non-influential followers. In order to facilitate the aforementioned

study, two social media influencers were selected with careful consideration given to their active involvement in disaster-related communication within the specific context of Sri Lanka. This study considered two distinct social media platforms utilised by the selected influencers to disseminate disaster-related information to their followers. As previously stated, the necessary data was obtained from the social media accounts administered by the relevant stakeholders through various methodologies. A combination of quantitative and qualitative analysis techniques were employed to carry out an examination that sheds light on the conduct of social media influencers in Disaster Risk Communication in Sri Lanka, as well as their engagement with the wider community. The primary application of sentiment analysis was to investigate their interactions with the broader community.

3.7. Sub Objective 07 - Identifying Gaps and Barriers, and Suggestions

The results of the analysis conducted in this study demonstrate various aspects of how social media platforms are used by different individuals involved in disaster risk communication in Sri Lanka. In this study, numerous factors were identified that contribute to the diminished efficacy of disaster-related information sharing through social media platforms in Sri Lanka. The aforementioned gaps and barriers have been identified as factors that can contribute to the improvement of social media practises in future disaster risk communication in Sri Lanka. Based on the insights derived from the analyses, recommendations were put forward to address the identified gaps and barriers. The proposed suggestions underwent a process of validation by subjecting them to scrutiny and evaluation by experts in the specialised field of disaster risk management. The present study has investigated the potential effectiveness of the suggested recommendations in improving the utilisation of social media platforms for the purpose of facilitating effective communication of disaster risks in Sri Lanka. This study has investigated the methods through which the suggested recommendations can be implemented to enhance the advancement of the Multi-Hazard Early Warning system in Sri Lanka, with a specific emphasis on enhancing warning dissemination and communication.

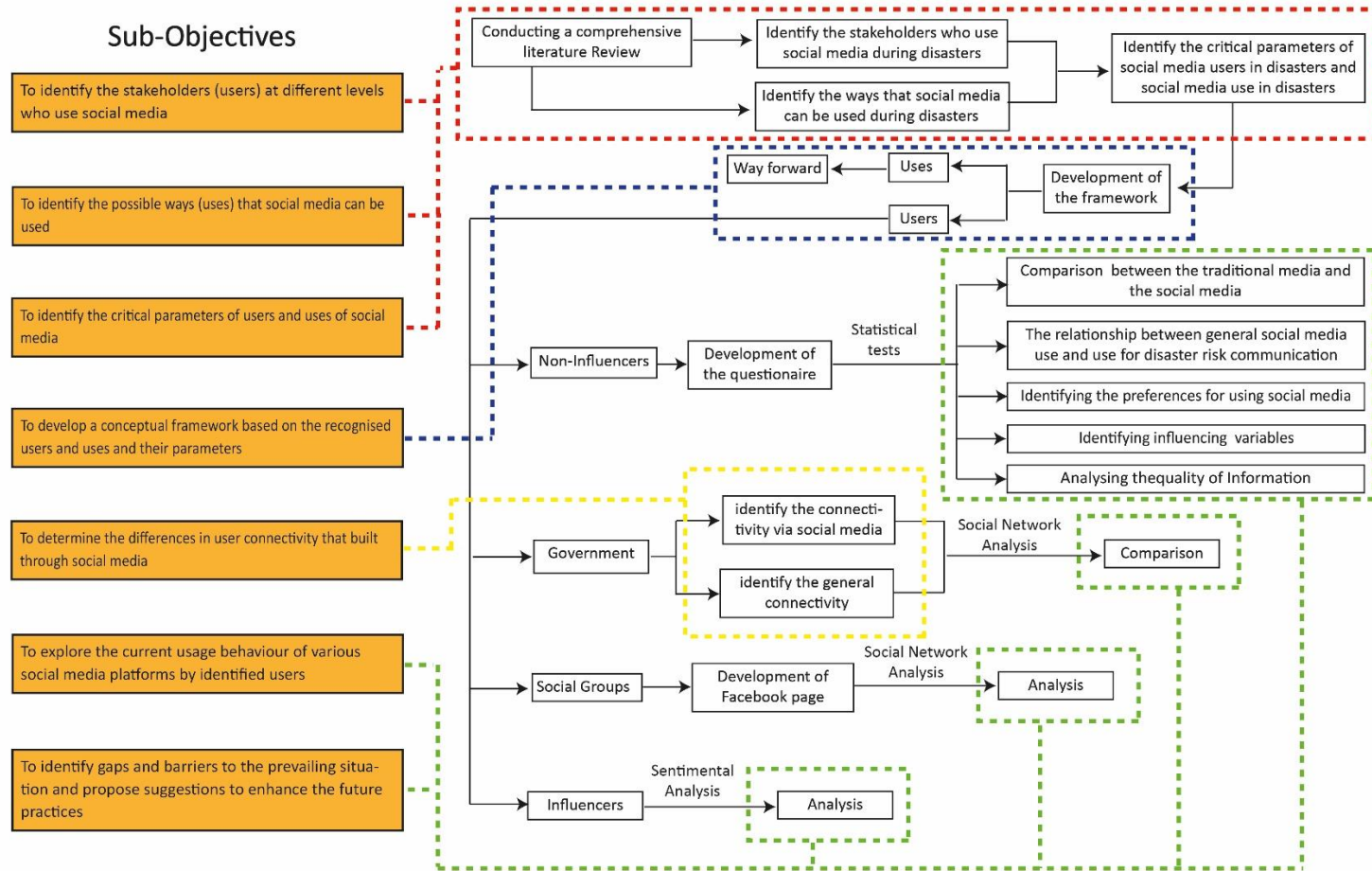


Figure 3-1: Visual representation of the approach employed in the current study

CHAPTER 4: A CONCEPTUAL FRAMEWORK FOR DISASTER RISK COMMUNICATION ON SOCIAL MEDIA IN SRI LANKA

This section provides a detailed explanation of the process involved in developing the proposed framework for the utilisation of social media in Disaster Risk Communication, specifically within the context of Sri Lanka. The framework was constructed by employing the information obtained from the literature review, and a set of procedures were implemented to facilitate its development. This chapter presents a comprehensive overview of each individual step, providing a detailed analysis of the framework by utilising graphical representation.

4.1. The Need for a Framework

The present analysis acknowledges various challenges and limitations associated with the utilisation of social media during global calamities, such as the case of Sri Lanka. These obstacles and barriers impede the effectiveness of social media platforms in terms of accessibility, credibility, and forward-looking application [254]. The reduced effectiveness of utilising social media for Disaster Risk Communication can be ascribed to various recognised barriers, such as insufficient coordination and training of personnel responsible for overseeing these platforms, a scarcity of skilled communicators assigned with allocating suitable responsibilities, ethical considerations, and a deficiency in message integration. The incorporation of a comprehensive study that utilises sophisticated methodologies, such as frameworks or models, would yield advantageous outcomes in addressing these challenges and improving the efficacy of social media platforms for Disaster Risk Communication [255]. The research conducted by [52], highlights the lack of a comprehensive framework for the utilisation of social media in the context of Disaster Risk Communication. This framework can be utilised to ascertain prospective enhancements and integrations in the realm of social media. Moreover, this will be advantageous in the identification of current shortcomings and challenges in the utilisation of social media for disaster management [52]. Given the continuous advancements in social media performance, technical innovations, and shifts in online behaviours, it is imperative to establish a relevant, up-to-date, and valuable conceptual

framework [256]. This study presents a comprehensive conceptual framework aimed at improving the current practise of social media in Disaster Risk Communication in Sri Lanka. As previously mentioned, a thorough examination of the existing body of literature was conducted, encompassing scholarly articles and online sources, such as blogs and websites authored by various government and non-governmental entities focused on disaster-related topics. The relevant materials were identified by conducting keyword searches in databases such as Google search, Google Scholar, and ResearchGate. After conducting a comprehensive examination and analysis of the gathered resources, the proposed framework was developed within the specific context of utilising social media for Disaster Risk Communication in Sri Lanka. The theoretical underpinnings of this framework are based on the fundamental concepts of "Actors" and "Actions". The term "actors" pertains to individuals who employ social media platforms in order to participate in the communication of disaster risk. Conversely, the term "actions" encompasses a diverse array of applications of social media throughout various stages of a disaster [52], [257]–[260].

4.2. Recognition of Social Media Users

Numerous studies have provided evidence of diverse user classifications that utilise social media platforms for the purpose of distributing disaster-related information to distinct audiences at various stages [52], [94], [256]. In the course of these inquiries, a diverse range of users has been identified, encompassing individuals, governmental and non-governmental organisations, non-profit entities, news media outlets, journalists, celebrities, community groups, and researchers. The investigation of [52] has categorised different user demographics that utilise social media as a means of communication for Disaster Risk Communication, as illustrated in Table 4-1.

Table 4-1: Descriptions of the user categories that engage through social media platforms for the determination of DRC

Category of User	Description
Individuals	Individuals are those who refrain from utilising social media platforms during a crisis event in order to act as representatives for entities such as governmental bodies or organisations
Community Groups	Communities refer to collective entities within society that facilitate the transmission of information, attitudes, norms, interests, and experiences. These entities may or may not be confined to a specific geographic location, such as communities or villages
Organisations	Organisations are formally organized teams of the community who are reacting to, impacted by, or affected by a catastrophe
Government Stakeholders	Governments are made up of authorities, organizations, and institutions at the federal, state-wide, and municipal levels
News Media	The news media is a component of the mass media that is primarily focused on the distribution of news to either the general public or a specific target audience. The aforementioned group may encompass the broader population or a substantial portion thereof.

Individuals tend to be mainly separated into two groups based on their location during a disaster, which can be named as inside and outside the disaster-prone zone. After reviewing the literature, numerous individual disaster-related social media users, such as those who are affected, those who are not affected, journalists, celebrities, and public figures, were discovered [94]. Therefore, it can be inferred that social media users who engage in DRC can be categorised into two groups: influencers, who are responsible for producing influential content on social media platforms, and non-influencers, who primarily consume and follow such content.

The individual who has had the most notable influence on the dissemination of information pertaining to disaster exchange is commonly referred to as an influencer [261]. The study conducted by [262] examined the utilisation of Twitter during the 2014 Australian bushfires, revealing that influential individuals on social media played a significant role in disseminating disaster-related information through the platform. Based on the research findings, it has been observed that social media influencers play a crucial role in the dissemination of information to the general public through various social media platforms. Individuals who lack significant influence on social media platforms rely on prominent content creators to obtain disaster-related information, either through direct or indirect means. The majority of individuals who utilise social media during times of crises are users who primarily engage in exchanging information rather than disseminating disaster-related updates [263]–[265].

In times of calamity, numerous community organisations have taken the initiative to disseminate timely information to the general public via social media platforms. These groups comprise volunteers, researchers, and benefactors. The administrators of these public community organisations collect information from a diverse range of credible sources, such as the Meteorology Department, the National Emergency Authorities, Police Departments, Local Governments, and the News Media. In addition, these community organisations disseminate up-to-date information sourced from social media users in a timely manner. In addition, individuals seek assistance and direction by sharing diverse sets of information and challenges, including recent updates on road closures. This exemplifies their capacity to promptly identify genuine issues and promptly offer resolutions through the dissemination of this information [134].

Organisations can be classified into distinct categories, namely governmental, non-governmental, and non-profit, each employing social media platforms for diverse objectives in the context of disaster situations [267]. At the organisational level, the utilisation of social media for disaster-related objectives can be classified into two primary classifications. Social media platforms can serve as a passive means of distributing information and collecting user feedback through incoming messages, posts, and polls. The utilisation of social media as a tool for digital rights management

(DRM) constitutes a secondary approach. The systematic utilisation of the medium may encompass various aspects, including: 1) employing it for the purpose of communication and issuing alerts; 2) utilising social media platforms to collect requests for assistance from victims; 3) monitoring user activity and posts to develop an understanding of the prevailing situation; and 4) employing uploaded images to assess the extent of damage [268]. Government organisations have extensively employed social media platforms. A notable instance is the COVID-19 pandemic, wherein social media emerged as a potent communication tool for health emergencies. It facilitated the coordination of pertinent stakeholders and offered facilities for effective collaboration.

The study previously discussed the distinction between content developers and consumers within traditional media, as a result of the one-way communication channels typically utilised. Conversely, individual entities engaged in the provision of information distribute said information to a substantial audience. Nevertheless, with the emergence of social media, individuals now have the ability to both produce and consume content due to its facilitation of interactive communication channels. Hence, the identification of the entity responsible for defining a consumer within the realm of social media is not as readily apparent. The notion of user identity in the context of social media usage during disasters lacks clarity.

The social media users mentioned above can be classified into two main categories: communities and agencies. The Community segment encompasses a diverse range of individuals, including both influencers and non-influencers, as well as various community groups. Conversely, the Agencies section encompasses both governmental and non-governmental organisations, in addition to news media outlets. The majority of these organisations are organised with a specialised framework of disaster protocols and possess expertise in their respective fields. Furthermore, a thorough analysis of the current body of literature demonstrates the existence of diverse forms of interactions among users of social media platforms in times of crises, as exemplified by (a). The dynamic relationship among agencies (b), the reciprocal engagement between

agencies and the community (c), and the interconnectedness between diverse communities [230], [259].

4.3. Recognition of the Uses of Social Media

As stated earlier in this section, social media is being employed throughout different phases of the Disaster Risk Management Cycle (DRMC). The integration of social media into the various stages of the DRMC can be discerned by virtue of the existence of multiple stages within the cycle. The literature review conducted for this study revealed several instances that demonstrate the effective utilisation of social media during past global disasters. The examination of relevant literature also uncovered the favourable results attained by employing social media for various objectives during previous disasters, as opposed to the outcomes observed prior to the integration of social media for these purposes. The determination of accountable stakeholders for each utilisation of social media in a disaster can also be inferred from extant scholarly literature. Table 4-2 presents an inclusive overview of the diverse applications of social media throughout different stages of a disaster, as identified in the extant scholarly works. The temporal sequence can be categorised into three primary phases, namely the pre-event phase, the event phase, and the post-event phase. The pre-event phase pertains to the duration preceding the event, whereas the event phase denotes the factual happening of the event. The phase that occurs after an event, known as the post-event phase, encompasses the time period immediately following the conclusion of the event. Furthermore, a transitional phase referred to as the pre-event to post-event phase serves as an intermediary stage that connects the pre-event and post-event phases.

Table 4-2: The utilisations of social media platforms in various phases of a calamity

Use of social media	Disaster Phase	References
To disseminate disaster readiness knowledge and early warnings across the country or region	Pre-Event	
To identify and signalling specified hazards locally To provide and receive the necessary information that is useful before occurring a disaster	Pre-Event to Event	[269] [270]
To give the most up-to-date information on who is in the catastrophe exaggerated area. To notify relatives and companions who are not in the areas influenced by the disasters To seek for and convey support and assist To address the rumours which are spreading To improve the situational awareness of the relevant authorities by using some facilities of the social media such as providing a geotagged photograph To keep track of a disaster's progression or to do disaster impact estimates	Event	[161] [256] [52]

To understand the needs of the general public, which are required for relevant authorities		[164]
<p>Raise awareness of the donation relief efforts and mobilise and coordinate volunteers</p> <p>To help relevant authorities to recognise prevailing requirements and obtainable supplies for recovery</p> <p>To chronicle the events occurring amidst a calamitous event</p> <p>To distribute and consume news coverage pertaining to the disaster</p> <p>To provide and achieve health assistance in the domains of behavioural, mental, and emotional well-being</p> <p>To facilitate the dissemination and reception of up-to-date information and alerts</p> <p>To communicate sympathy and emotion</p> <p>To exchange information in order to talk about disaster response, recovery, and rehabilitation</p> <p>To use social media features like sharing, tagging, and commenting to aid in the development of partnerships between appropriate authorities and aid agencies</p>	Event to Post-Event	<p>[271]</p> <p>[272]</p> <p>[273]</p> <p>[274]</p> <p>[275]</p>

<p>To conduct an analysis of events, it is necessary to consider various social, political, and scientific factors, as well as indications and attributions of responsibility</p> <p>To foster community cohesion and strengthen social bonds</p>	<p>Post-Event</p>	
<p>Apply what you have learned to create new/improved social media apps</p>	<p>Post-Event to Pre-Event</p>	

4.4. Development of the Framework

The subsequent passage examines the projected framework for the utilisation of social media in the context of a disaster. Figure 4-1 presents a visual representation of the initial framework that was developed based on the identified groupings relevant to the subject matter, as discovered through the comprehensive review of existing literature.

The development of the proposed framework in this study was primarily based on the critical parameters identified in the literature review chapter. Two key aspects, namely "Actors" and "Actions," which were previously discussed in this study, were given primary consideration. The aforementioned topics have been deliberated upon in accordance with the established parameters and additional information gleaned from the literature review.

The users are the leading indicator in the "Actors" category. Users may be introduced as producers or responders. Since social media allows for two-way contact, any subset of people can utilise it to supply and obtain disaster-related information. Users are divided into two categories: community and agencies. The Agencies category includes the government, organisations (Non-Government and Non-Profitable), and news broadcasting media. The Community can be separated into two subgroups, as indicated before in this chapter: Individuals and groups. The groups are the community's subgroups, including volunteers, philanthropists, scholars, and other groups of people who have assembled for relevant actions such as early warning dissemination, relief, aid distribution, and research. According to the literature review, these types of groups use social media for disaster-related reasons, such as uploading public evacuation messages to social media platforms, Twitter accounts, and WhatsApp groups.

Furthermore, literature may be used to distinguish between two sorts of individuals: Influencers and Non-Influencers. Individuals can be designated as influencers based on their level of influence in communicating relevant and valuable information on disasters via social media. Non-influencers can be categorised into two distinct groups according to their geographical location, namely those situated within the disaster zone and those situated outside of it.

The primary indicator in the 'Actions' category is the uses. Figure 4-1 depicts several social media applications at each phase of a disaster incident, as detailed previously under the Disaster Risk Management Cycle.

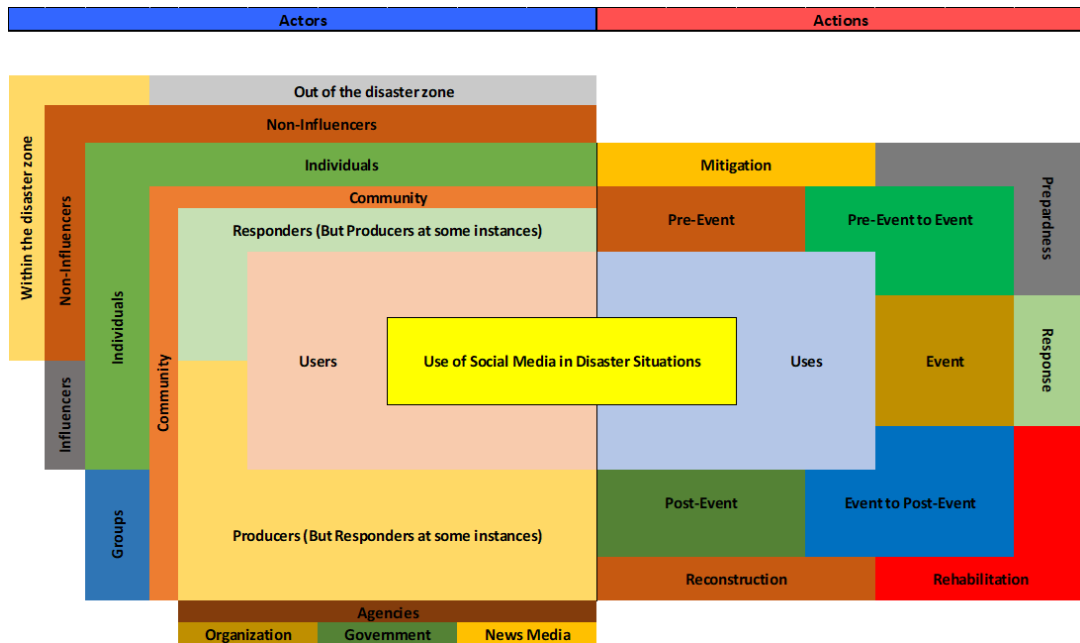


Figure 4-1: Graphical illustration of the proposed initial framework

The primary focus of this study pertains to individuals who utilise social media platforms during times of catastrophes in third world developing country of Sri Lanka. To enhance the "user" section of the framework, relevant parameters and facts extracted from existing literature were taken into account.

Within the framework of employing social media during catastrophic events, Figure 4-2 visually depicts the diverse array of interactions that occur among users of social media platforms. As elucidated in this particular section, three distinct types of connectivity can be discerned: The user's text is too short to be rewritten academically. The collaboration among the agencies. The dynamics of engagement between governmental agencies and the broader public sphere. The phenomenon of interaction among diverse communities. Figure 4-2 aptly demonstrates the wide array of disaster stages and activities in which consumers can actively engage by utilising social media platforms for the purpose of Disaster Risk Communication.



Figure 4-2: Interactions of users and the corresponding actions available to them within the DRMC through the operation of social media platforms.

An extensive review of the available literature has revealed numerous noteworthy discoveries regarding the usage of social media by non-influential individuals in times of disasters. Individuals who lack influence or social status play a crucial role in utilising social media platforms during catastrophic events, as they are more likely to receive information related to disasters. Hence, it is imperative to elucidate the essential aspects pertaining to the utilisation of social media within the Non-

Influencers community for the purpose of Disaster Risk Communication. Since they are the most susceptible "Users" during disasters, Non-Influencers' perceptions of information obtained via social media are of paramount importance when using social media throughout catastrophes. The quality of social media information should be enhanced to maintain good awareness. Table 4-3 lists numerous quality indicators that have been recognised in previous studies [134], [160] to assess the information quality obtained via social media in disasters.

Table 4-3: Indicators of informational quality used to evaluate content found on social media

Quality Indicator	Clarification	References
Accuracy	The attribute of being accurate or exact, especially in minute aspects, defines the accuracy of information or measures. The ability to check information is referred to as accuracy	[160]
Timeliness	The presumption of time for availability and information availability is referred to as timeliness The gap between the expectation of information and its attainability for use is referred to as timeliness	[276]
Usefulness	Usefulness is about figuring out what kinds of information people utilise and how they use it to generate an understanding of what is happening in the environment	[277]
Trustworthiness	The assessment of the accuracy and trustworthiness of information plays a	[278]

	crucial role in determining the potential risks associated with its consumption by users	
Simplicity	The user's capacity to comprehend the full capabilities of the information's explanation	[279]
Perfectibility	The extent to which there is appropriate diversity and comprehensiveness of the information for the assigned task	[280], [281]

Apart from the quality indicators, several additional essential factors were discovered during the literature review, which are crucial in the background of Non-Influencers. These findings will prove valuable in examining the utilisation of social media among the Non-Influencer population in Sri Lanka. An essential aspect to take into account pertains to the acknowledgment of prevailing social media usage patterns exhibited by individuals who do not possess influential status. The assessment of Non-Influencers' ability to effectively utilise social media during crises is of paramount significance. Additionally, it is imperative to identify the current mechanism, namely conventional media, that is utilised for the dissemination of information and addressing the various challenges associated with disasters. Understanding the prevailing strategies is of utmost importance in order to effectively implement optimal social media tactics in times of disasters. Two additional crucial factors to take into account are the Non-Influencers' comprehension of the competencies involved in utilising social media during catastrophes, as well as their potential for utilising social media in the context of disasters. With these fundamental facts in hand, Non-Influencers can compare traditional and social media to determine the best tactics and channels utilised during disasters. Figure 4-3 depicts the proposed integrated framework, including all the aforementioned factors and indicators.

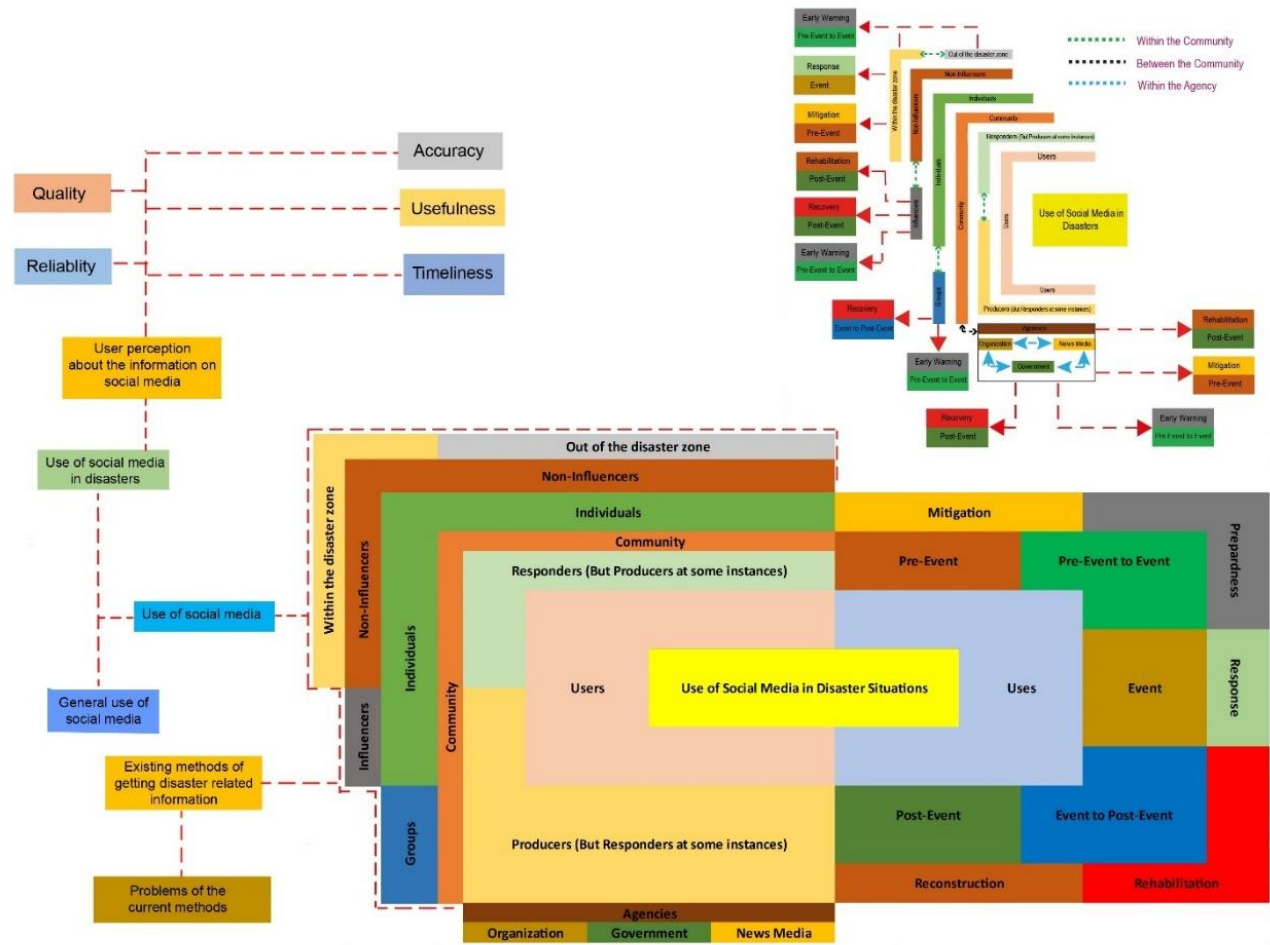


Figure 4-3: Developed integrated framework

4.5. Discussion on the Proposed Conceptual Framework

The existing body of scholarly works suggests that a framework refers to a systematic arrangement or organisation that has the capacity to encompass or uphold the theoretical underpinnings of a research investigation. The framework provides an introduction and description of the foundational theories that have been utilised to explain the occurrence of the research problem being investigated [282]. The present study introduces a framework that delineates several factors that necessitate examination for the purpose of augmenting the effectiveness of social media in the context of Disaster Risk Communication. The identification and acknowledgment of prevailing disparities and obstacles play a crucial role in improving the effective utilisation of social media platforms for Disaster Risk Communication. Hence, this framework will be advantageous in facilitating the progress and improvement of scientific investigations and studies concerning the utilisation of social media in Disaster Risk Communication within the specific context of Sri Lanka. The conducted literature review revealed a dearth of an appropriate framework for efficiently leveraging social media for Disaster Risk Communication within the current global body of literature. As a result, an initial measure was undertaken to establish a conceptual framework for the application of social media in Disaster Risk Communication in Sri Lanka. It can be deduced that the existing framework plays a pivotal role in facilitating the proliferation of social media utilisation for the purpose of Disaster Risk Communication.

The present research study developed its initial conceptual framework based on two key scenarios: the "Users" and the "Uses" of social media during times of disasters. The primary focus of the study pertained to the "User" component of the framework. The extension of the study was predicated on the examination of user connectivity during various stages of the Disaster Risk Management Cycle (DRMC), the identification of social media usage patterns within the DRMC, and the correlation between these patterns and different disaster phases outlined in the DRMC. Furthermore, the framework was successfully incorporated with essential elements, including quality parameters of information, comparison with traditional media, and

comparison with the overall usage of social media as proposed by previous scholars. The objective of this study is to investigate the usage of social media platforms for communication pertaining to disasters in a specific nation, such as Sri Lanka.

The integrated framework was presented and validated by experts with a strong reputation in the fields of Disaster Risk Reduction, Disaster Risk Management, and Disaster Risk Communication. The developed framework revealed a comprehensive perspective on the examination of the prevailing social media practises in Sri Lanka. Consequently, the subsequent sections of this study were formulated in accordance with the critical parameters that were identified using the framework. Multiple analyses were conducted to examine the identified user categories, taking into account the supporting components identified within the framework. Several gaps and barriers that require improvement for optimal social media practises in the realm of disaster-related communication in Sri Lanka were identified.

CHAPTER 5: ANALYSIS OF VARIOUS STAKEHOLDERS ENGAGED IN THE USE OF SOCIAL MEDIA FOR THE DISASTER RISK COMMUNICATION IN SRI LANKA

The forthcoming study aims to identify the existing social media behaviours exhibited by various segments of the Sri Lankan population in times of disasters. The study's framework facilitated the identification of various categories within the Sri Lankan community that employed social media as a means of transmitting information related to disasters. Therefore, in the subsequent sections of this study, the identified community categories were subjected to examination through a range of techniques, including the analysis of questionnaire results and various quantitative and qualitative analytical methods. Gaining insight into the prevailing behavioural patterns exhibited by Sri Lankan communities in their utilisation of social media platforms during times of crises would facilitate the identification of any prevailing deficiencies and challenges. Moreover, the present study has successfully identified potential strategies that can be employed in the future to address existing disparities and enhance the utilisation of social media during disaster situations in Sri Lanka.

5.1. Analysis of the Non-Influencers

Out of various users who used social media throughout disasters in Sri Lanka, non-influenced individuals can be identified as the most significant. The fact is that the people who belong to that category have the highest vulnerability to disasters [283]. Therefore, to have a proper DRM practise in a country, it is necessary to prioritise them. Consequently, having a proper social media practice among the non-influenced general community will be helpful to have an adequate DRM in Sri Lanka. To improve the effectiveness of social media practises in sharing information about disasters, it is crucial to assess how non-influencers currently use social media platforms for disaster communication. The present study has employed a well-established conceptual framework to identify multiple factors that contribute to a comprehensive understanding of social media usage by the non-influencer community in Sri Lanka during times

of crises. Consequently, with the specified parameters identified from the developed framework, an online questionnaire with several questions was developed to reveal the prevailing background on using social media throughout catastrophes in Sri Lanka.

5.1.1. Data Collection for the Analysis

An initial survey instrument was planned based on the questions identified from the literature and was verified by the experts who are specialised in Disaster Risk Management worldwide. Several critical parameters identified from the developed framework were considered for preparing the questionnaire's questions. Initially, a set of general questions were asked from the respondents to attain the respondents' demography. Subsequently, questions were added to explore the respondent's general social media practice and disaster-related communication. The development of the questions took into account a range of social media applications and the relevant stakeholders in the field of disaster management, with a specific emphasis on the utilisation of social media platforms for communication purposes in times of disasters. Survey Monkey is an online platform that is licenced and operates on a fee-based model. It serves as a facilitator for the creation and administration of surveys within communities, utilising digital channels. The questionnaire was systematically developed using the Survey Monkey platform and distributed among members of the general community at different levels through the platform's provided means. The survey was distributed across multiple social media platforms and messaging applications, including posting on Facebook community groups and pages, as well as sharing the questionnaire link through WhatsApp groups and email. The estimated duration for completing this survey was approximately 15 to 20 minutes. In distributing the online questionnaire, we considered all age levels, occupations, and areas of residence, covering the whole of Sri Lanka. In total, a sample size of 473 responses was obtained, with a completion rate of 86.27 percent (408 respondents) who fully completed the questionnaire. The questionnaire that has been developed is provided in ANNEX 1.

It is necessary to have a sufficient sample size, i.e., adequate responses to properly represent the Sri Lankan community to analyse the general community. Therefore,

Krejcie and Morgan's formula was used to determine the sample size as presented in Equation 1 [284].

$$s = \frac{x^2 \times N \times p \times (1 - p)}{(e^2 \times (N - 1) + x^2 \times p \times (1 - p))} \quad (1)$$

s = Required sample size

N = Population size

e = Degree of accuracy expressed as a proportion (0.05)

x^2 = The table value of chi-square for 1 degree of freedom at the desired confidence level

p = The population proportion (assumed to be 0.5 since this would provide the maximum sample size).

According to United Nations data, in 2020, the Sri Lankan population was estimated at 21,413,249. Hence, from the equation above, for a 95% confidence level and 0.05 degree of accuracy, a sample size should be 384 for the population of Sri Lanka. For this study, 408 respondents had filled out the online questionnaire. Therefore, sufficient sample size was obtained to analyse the outputs of the questionnaire.

During the preliminary phase of the analysis, an assessment was conducted to verify the dependability of the collected response data. According to the research conducted by [285], there exist three primary approaches for assessing reliability: test-retest reliability, equivalent (or parallel) forms reliability, and internal consistency reliability. The internal consistency approach has been recognised as the preferred method for estimating reliability due to its lack of requirement for test administration repetition or the use of multiple test forms.

According to the literature, internal consistency reliability estimates can be carried out in several ways. The utmost accustomed are the (a) split-half adjusted [286], (b) Kuder-Richardson formulas 20 (also known as K-R20) [287] and (c) Cronbach alpha

[288]. According to the literature, the K-R20 and Cronbach alpha are the internal consistency estimates that are commonly reported. In either case, the reliability of a given set of test findings is soundly underestimated. The utilisation of the K-R20 is limited to surveys where the items are scored dichotomously. (i.e., correct, or incorrect). When test items are scored dichotomously, Cronbach's alpha can be employed as an alternative to K-R20. One advantage of using Cronbach's alpha is its ability to accommodate weighted items. (For example, on a scale ranging from 0 to 5). Given that the questionnaire devised for the current investigation comprises items that necessitate scoring in both a dichotomous manner and with weights assigned, it is argued that Cronbach's alpha is a more suitable measure of reliability than K-R20 for the response data in this study.

The Cronbach alpha parameter was utilised to assess and confirm the reliability of the response data. The Cronbach alpha coefficient is commonly employed as a measure of internal consistency and reliability for items [289]. If the value of Cronbach's alpha is below 0.3, it indicates that the data is deemed unsuitable for further investigation due to its inadequate reliability. Data is considered suitable for additional examination when the Cronbach alpha exceeds 0.7, indicating a substantial degree of reliability [290]. Equation 2 typically computes Cronbach alpha for a given data sample, but for the collected data for this particular study, it was calculated using IBM SPSS Statistic 26 software.

$$\alpha = \frac{N - c}{-v + (N - 1) - c} \quad (2)$$

Where;

α = Cronbach alpha

N = Number of items

c = Average covariance between item pairs

v = Average variance

According to the software results, Cronbach's Alpha is 0.701 (more than 0.7) with seven items. Therefore, the data set can be considered a highly reliable data set, and the composed data could be considered for the subsequent exploration.

5.1.2. Results of the Analysis

Various types of raw data were obtained through the online questionnaire, which was beneficial to exploring the existing behavioural state of utilising social media by the non-influenced general community in Sri Lanka. Various interpretations can be obtained via proper analysis techniques through the different questions added to the questionnaire. Therefore, several analytical methods were used to interpret the outcome from the collected data, which are illustrated in the following section.

5.1.2.1. The Demographic Characteristics of the Respondents

Prior to starting the detailed analyses of the raw data obtained from the questionnaire, it is necessary to have a proper idea of the demographic characteristics of the respondents who participated in the questionnaire. Consequently, in order to initiate the quantitative analysis, descriptive statistics were conducted for the participants who completed the online questionnaire, as illustrated in Table 5-1. Determining the geographical distribution of respondents is of utmost importance for the present study. The findings indicate that the participants in the study were drawn from nearly all districts, with the exception of Mannar and Mullaitivu. The Colombo district represents 30.88 percent of the overall respondents, whereas the Gampaha district represents 20.10 percent. Figure 5-1 illustrates the distribution of respondents across different districts.

Table 5-1: The demographic characteristics of the participants

Demographic Feature	Variable	Frequency	Percentage (%)
Gender	Male	235	57.6
	Female	173	47.4
Age	Below 18	12	2.9

	18-24	113	27.7
	25-34	191	46.8
	35-44	37	9.1
	45-54	29	7.1
	55-64	19	4.7
	65+	7	1.7
Educational/Professional Status	Undergraduate Students	122	29.9
	Engineering	78	19.11
	University Academics	50	12.25
	Postgraduate Students	63	15.44
	Medicine	8	1.96
	Legal	4	0.98
	Management	48	11.76
	Other	35	8.53

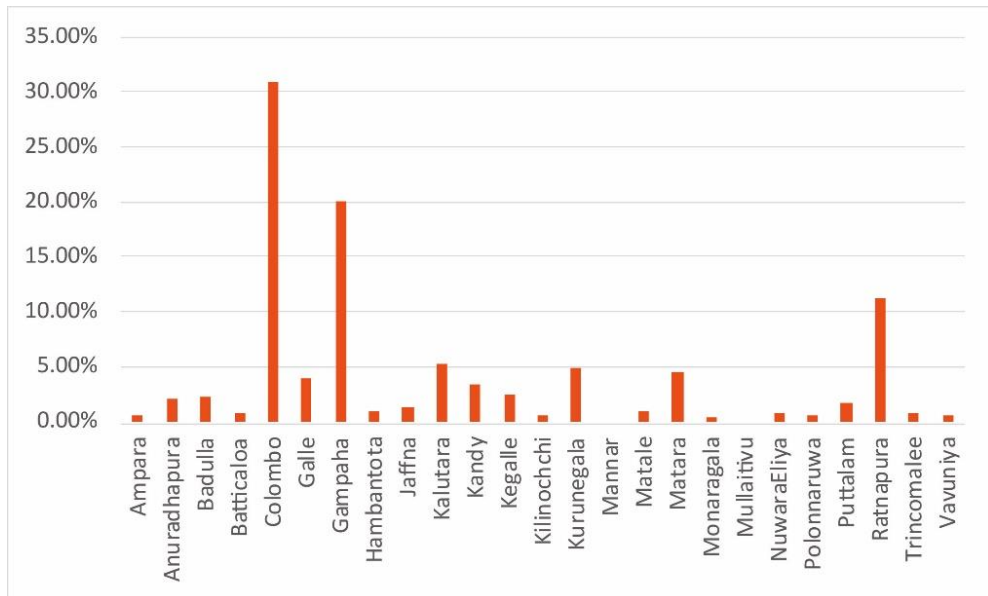


Figure 5-1: Proportion of respondents belonging to each district

5.1.2.2. A Comparative Analysis of the Utilisation of Traditional Media and Social Media in the Context of Disaster Risk Communication

An additional inquiry has been integrated into the digital survey with the aim of ascertaining the perspectives of the participants regarding the most effective means of communication between social media platforms and traditional channels. Around 60% of the respondents stated that social media is better than traditional media in receiving disaster-related information. It is needed to verify whether this proportion of responses fit the whole representative population. The Chi-square goodness of fit test is a statistical hypothesis test that determines whether observed frequencies deviate significantly from their expected values across categories [291]. The Chi-Square value (X^2) for the data was obtained as 15.686 for the degree of freedom (df) = 1 and, the significance level (α) has been taken as 0.05. According to the chi-square distribution table, the Chi-square value with $\alpha = 0.05$ and 1 degree of freedom is 3.841 [292]. Since $15.686 > 3.841$, the null hypothesis was rejected. It defines that the proportions obtained are good enough to represent the respondent's opinion on better communication channels between social media and conventional channels. Table 5-2 displays the results of the current analysis performed utilising IBM SPSS Statistics 26 software, hereafter referred to as SPSS.

Table 5-2: Results of the Chi-Square Goodness of Fit Test

	Observed N	Expected N	Residual		Test Statistics
No	164	204.0	-40.0	Chi-Square	15.686 ^a
Yes	244	204.0	40.0	df	1
Total	408			Asymp. Sig.	0.000
None of the cells (0.0%) have expected frequencies that are less than 5. The anticipated minimum frequency of cells is 204.0.					

5.1.2.3. The Connection Between Day-to-Day Use of Social Media and the Application it in the Field of Disaster Risk Communication

The study examined the overall utilisation of social media by the participants, as well as their use of social media for communicating during times of disaster, based on the data collected from the questionnaire. The study involved 473 participants, of which 408 individuals, representing 86.3% of the sample, indicated their overall utilisation of social media. In addition, it was found that a significant proportion of the total sample, specifically 293 respondents or 71.8%, reported using social media as a means of communication in the context of disaster situations. Table 5-3 presents a cross-tabulation table that was generated using IBM SPSS Statistics 26 software. This table was created to obtain a thorough comprehension of the participants' usage of social media.

Table 5-3: Constructed cross tabulation to examine the utilisation of social media among the participants

			Use of social media to receive general information		Total
			<i>No</i>	<i>Yes</i>	
Use of social media to obtain disaster-related information	<i>No</i>	Count	56	59	115
		% within General use of social media	100.0%	16.8%	28.2%
	<i>Yes</i>	Count	0	293	293
		% within General use of social media	0.0%	83.2%	71.8%
Total	Count		56	352	408
	% within General use of social media		100.0%	100.0%	100.0%

The study employed the Chi-Square test to examine the association between overall social media utilisation and the use of social media for accessing disaster-related information, both of which were categorical variables. The chi-square test is a nonparametric statistical method that is employed to evaluate the presence or absence

of a statistical association or independence between multiple categorical variables. Table 5-4 displays the software outcomes of the Chi-Square test performed on the aforementioned pair of categorical variables.

Table 5-4: Results of the Chi-Square test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	165.377 ^a	1	0.000		
Continuity Correction	161.290	1	0.000		
Likelihood Ratio	167.013	1	0.000		
Fisher's Exact Test				0.000	0.000
Linear-by-Linear Association	164.972	1	0.000		
N of Valid Cases	408				
<p>a - 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 15.78.</p>					

In this experiment, the chosen significance level (α) was set at 0.05 or lower. The null hypothesis for the Chi-Square test posits that there is no association between the two categorical variables in the population, indicating that they are independent variables [59]. The Pearson Chi-Square value represents the primary outcome derived from the software's output. The Pearson Chi-Square value is 165.377, with 1 degree of freedom (df). The calculated asymptotic significance value, also known as the P-value, is determined to be 0. Based on the findings, the null hypothesis was rejected due to the p-value being lower than the predetermined significance level ($\alpha = 0.05$) ($X^2(1) = 165.377, p \leq 0.05$). The findings suggest a notable correlation between the utilisation of social media for accessing general information and the utilisation of social media for obtaining disaster-related information among the general population in Sri Lanka.

Moreover, it is important to note that these two variables are not independent of each other.

5.1.2.4. Identifying Variables Influencing the Use of Social Media

The main objective of this section is to identify the factors that impact the utilisation of social media by Sri Lankans for disaster communication, as well as to examine how these factors differ across the current practises of using social media for transmitting information pertaining to the Sri Lankan disaster context. The literature review has successfully identified various factors that have been observed to have an impact on the utilisation of social media in the realm of disaster-related communication. Previous studies have indicated that there is considerable variation in the sources of disaster-related communication utilised by the general public, which is contingent upon demographic variables [293]. As a result, demographic data, namely age, gender, occupation, location as well as former disaster experiences, are taken into account. Respondents were asked to classify the prevalence of usual natural and anthropogenic hazards within their communities. Each respondent was asked to assign a number rating from 0 to 6 based on the intensity of their previous experiences.

Binary logistic regression is a statistical technique employed to establish a mathematical model that describes the association between a binary dependent variable and one or more independent variables. It is the study utilised regression analysis to investigate the associations between different predictors, referred to as independent variables, and the utilisation of social media within the domain of disaster communication, which was considered the dependent variable. The statistical analyses were performed using the IBM SPSS Statistics 26 platform. The identification and classification of variables used in the analysis were conducted in the SPSS software, with reference to their respective data types, as depicted in Table 5-5.

Table 5-5: The categorization of the variables employed in the research

Dependent Variable		Independent Variable			
<i>Categorical (Qualitative)</i>		<i>Scale (Quantitative)</i>	<i>Categorical (Qualitative)</i>		<i>Scale (Quantitative)</i>
Nominal	Ordinal		Nominal	Ordinal	
Usage of social media during disasters (V1)	-	-	Gender (V2)	Age group (V3)	Past experiences of disasters (V4)

Binary logistic regression is a statistical method used to establish a model that examines the association between binary dependent variables and one or more predictor factors, commonly referred to as independent variables. Furthermore, utilising the predictors incorporated in the model, it evaluates the probability that a particular case is associated with either of the two categories on the dependent variable. Prior to conducting an analysis utilising Binary Logistic Regression, it is imperative to ascertain that specific prerequisites have been satisfied.

In order to evaluate the dependent variable, it is recommended to employ a dichotomous scale, wherein the dependent variable is qualitative and exhibits exactly two distinct levels. It is necessary to include one or more independent variables, which can be either measured on a scale or categorised. The dependent variable must possess categories that are both mutually exclusive and exhaustive, while ensuring that the observations are independent. It is necessary for any continuous independent variables to exhibit a linear relationship with the logit transformation of the dependent variable.

The central objective of the present study was to investigate the independent variable, specifically the utilisation of social media during disasters (V1). The variable in question was classified as categorical, exhibiting two discrete levels. Within this particular context, the numerical value 1 is assigned to represent the value of 'No', whereas the numerical value 2 is assigned to represent the value of 'Yes'. The predictor factors utilised in this study encompassed Gender (V2), Age Group (V3), and Past Disaster Experiences (V4), serving as the independent variables under investigation.

In order to conduct this investigation, data was gathered via autonomous observations. The dependent variable was classified into discrete and inclusive categories.

The gender (V2) variable in the Binary Logistic Regression analysis used the 'Female' category as the reference, while the age (V3) variable used the 'Below 18' category as the reference. The findings of the Binary Logistic Regression analysis are presented in the following section.

The outcomes of the Binary Logistic Regression analysis are given in blocks.

I. Block 0: Beginning Block

This block encompasses the outcomes of a paradigm lacking value, wherein none of the independent variables are scrutinised (Initial Block). The results obtained in Block 0 of this study are not advantageous as they pertain to the valueless model, which lacks any independent variables (predictors). The results in SPSS format are presented in Tables 5-6 and 5-7, as depicted below.

Table 5-6: The consequences associated with the Block

Classification Table ^{a, b}					
	Observed		Predicted		
			<i>Using Social Media in Disaster</i>		<i>Percentage Correct</i>
			No	Yes	
Step 0	<i>Using Social Media in Disaster</i>	No	0	79	.0
		Yes	0	329	100.0
	Overall Percentage				80.6
a. Constant is included in the model					
b. The cut value is 0.500					

II. Block 1

The Block 1 of the study presents the outcomes of a comprehensive model that considered all predictor variables included in the analysis. The evaluation of the

participation and statistical significance of each predictor variable in the model was performed within this block. The analysis in Block 1 was conducted by performing a series of tests using the Statistical Package for the Social Sciences (SPSS). The conclusive findings of the analysis are presented in Table 5-7, following the prescribed format within the SPSS software.

Table 5-7: Outcomes of Block 1

Variables in the Equation									
<i>Variables</i>		<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>	<i>95% C.I. for</i>	
								<i>EXP(B)</i>	
								<i>Lower</i>	<i>Upper</i>
Step 1 ^a	Age			12.891	6	0.046			
	Age (1)	1.163	0.680	2.915	1	0.089	3.198	0.843	12.144
	Age (2)	0.717	0.648	1.223	1	0.268	2.052	0.575	7.323
	Age (3)	-0.006	0.725	.000	1	0.994	0.995	0.241	4.107
	Age (4)	-0.214	0.741	.084	1	0.772	0.807	0.189	3.441
	Age (5)	0.174	0.818	.045	1	0.832	1.190	0.240	5.907
	Age (6)	1.063	1.248	.725	1	0.394	2.894	0.251	33.371
	Gender (1)	-0.042	0.262	.025	1	0.873	0.959	0.574	1.603
	Previous Experience	0.017	0.013	1.851	1	0.174	1.018	0.992	1.043

Based on the findings presented in Table 5-8, it is possible to identify certain patterns in the predictor variables associated with the utilisation of social media for accessing Disaster Risk Information by the Non-Influencers in Sri Lanka.

Existing empirical research indicates that there exists a statistically significant and positive correlation between prior experiences and the utilisation of social media in the aftermath of disasters in Sri Lanka. The probability of using social media during disasters in Sri Lanka is found to increase by a factor of 1.018 for every one-unit increase in the predictor, as demonstrated by the exponential of B (Odds Ratio).

Given the specific context of Sri Lanka, it can be observed that the variable of gender does not demonstrate a statistically significant predictive association with the utilisation of social media platforms during periods of crises. The observation of a negative regression coefficient (B) indicates that individuals who self-identify as females (coded as "1") exhibit a lower propensity compared to males to participate in the utilisation of social media platforms in the context of disasters.

In this study, six dummy variables were utilised to delineate age. The initial dummy variable examines the comparison between two age groups: 18-24 years (coded as "2" in the variable) and under 18 years (coded as the reference category "1" in the variable). The data indicates that there is a positive correlation between the coefficient and the age range of 18 to 24, indicating that individuals within this age group are more likely to engage with social media in comparison to those who are under 18. However, upon considering the alteration, it fails to exhibit statistical significance. The second dummy variable evaluates the extent of variation in age groups between individuals aged 25-34 (represented by a value of three in the variable) and those under 18. (Once again, the reference category is assigned the code "1" in the coding system.) No statistically significant difference was observed between the groups. The data indicates that individuals in the age range of 25-34 exhibited a greater propensity for utilising social media platforms in comparison to those who are younger than 18 years old, as evidenced by the positive coefficient. Nevertheless, this tendency was not as prominent as it was observed among individuals aged 18 to 24. The analysis involves comparing the age groups 35-44 (coded as "4" in the variable) with the reference category of under 18 (coded as "1" on the variable) using the third dummy variable. The negative coefficient indicates that individuals in the age range of 35-44 exhibited a lower propensity compared to those under 18 to engage with social media platforms during times of disaster. Nevertheless, the disparity observed does not demonstrate statistical significance. Likewise, the aforementioned dummy variables can be characterised in a similar manner.

5.1.2.5. Identifying the Preferences for Using Social Media

A Likert question was added to the questionnaire to express the respondents' preference for using different social media applications like Facebook, WhatsApp, and Twitter during disasters. The study utilised the Relative Importance Index (RII) methodology to evaluate and prioritise the respondents' preferences in employing social media applications for the purpose of disaster-related information sharing. Equation 2 was used to calculate the RII for each social media application in this study [294].

$$RII = \frac{\sum W}{A \times N} \quad (2)$$

Where:

RII = Relative Importance Index

W = Weighted respondent on a scale of weight given to each factor by the respondents from 1, 2, 3, 4 and 5 for very low, low, moderate, high and very high, respectively

A = Highest weight (for this analysis A = 5)

N = Total number of the sample

Previous studies have identified five distinct levels based on the Relative Importance Index (RII) values. These levels are categorised as high (H) when the RII falls within the range of 0.8 to 1, high-medium (H-M) when the RII falls within the range of 0.6 to 0.8, medium (M) when the RII falls within the range of 0.4 to 0.6, medium-low (M-L) when the RII falls within the range of 0.2 to 0.4, and low (L) when the RII falls within the range of 0 to 0.2 [295]. The relative important index was calculated for each social media application and the ranked preference levels are presented in Table 5-8.

Table 5-8: Relative Important Index and Ranked Preference

Product of the number of respondents given for each preference category and the weightage factor									
	Very Low (W ₁ × 1)	Low (W ₂ × 2)	Moderate (W ₃ × 3)	High (W ₄ × 4)	Very High (W ₅ × 5)	Total	N	RII	Preference Level
Facebook	22	50	234	344	390	1040	289	0.720	High - Medium
WhatsApp	7	42	207	360	500	1116	287	0.778	High - Medium
Twitter	133	52	132	148	165	630	273	0.462	Medium
Instagram	151	98	96	92	75	512	270	0.379	Medium – Low
Messenger	94	118	201	116	135	664	276	0.481	Medium
Viber	154	88	126	68	90	526	275	0.383	Medium-Low
Other	220	28	69	36	20	373	270	0.276	Medium-Low

Results show that the Sri Lankan community has the highest level of preference for using WhatsApp during disasters than the other social media platforms and messenger apps. Facebook is the second most preferred social media platform. Messenger and Twitter have been ranked third and fourth, respectively.

5.1.2.6. Analysing the Quality of Information Available on Social Media

Five major information sources in Sri Lanka currently distributing disaster-related information to the general public were identified. These are Government organisations, Non-Government Organisations, News Media Institutions, Influencers and Community groups. Three quality measures were considered; accuracy, timeliness and usefulness [134], to check the respondents' perception of the quality of the information disseminated by the sources mentioned above through their social media. Ranking questions were added to the online questionnaire for this analysis. For each inquiry, participants were requested to evaluate the information resources based on the precision, utility, and timeliness of the knowledge conveyed by specific sources. Henry Garrett Ranking method was applied to rate the information sources under the three quality measures according to the given importance by the respondents. In this method, respondents have been asked to assign the rank for all the information sources disseminating disaster-related information via social media. The outcomes of such ranking were converted into score values with using Equation 3 [296].

$$Percentage\ Score = \frac{100 \times (R_{ij} - 0.5)}{N_j} \quad (3)$$

Where:

R_{ij} = Rank, given for the i^{th} variable by the j^{th} respondent

N_j = Number of variables ranked by the j^{th} respondents

The numbers of respondents who ranked each quality measure from 1-5 are presented in Figure 5-2.

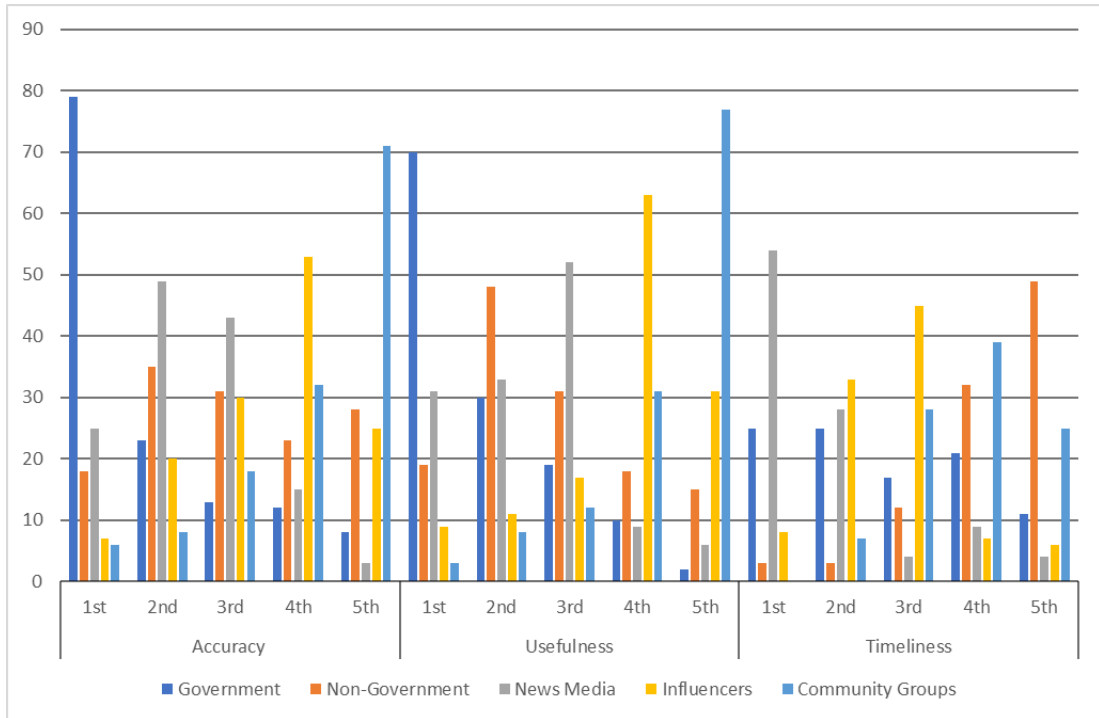


Figure 5-2: Quantification of respondents who assigned a ranking between 1 and 5 to each quality measure

According to Equation 3, the Percentage Score was calculated for each rank, and the Garret value for each percentage score was found using the Garret Ranking Conversion Table [297]. The calculated Percentage Score and Garret value for each rank are presented in Figure 5-3.

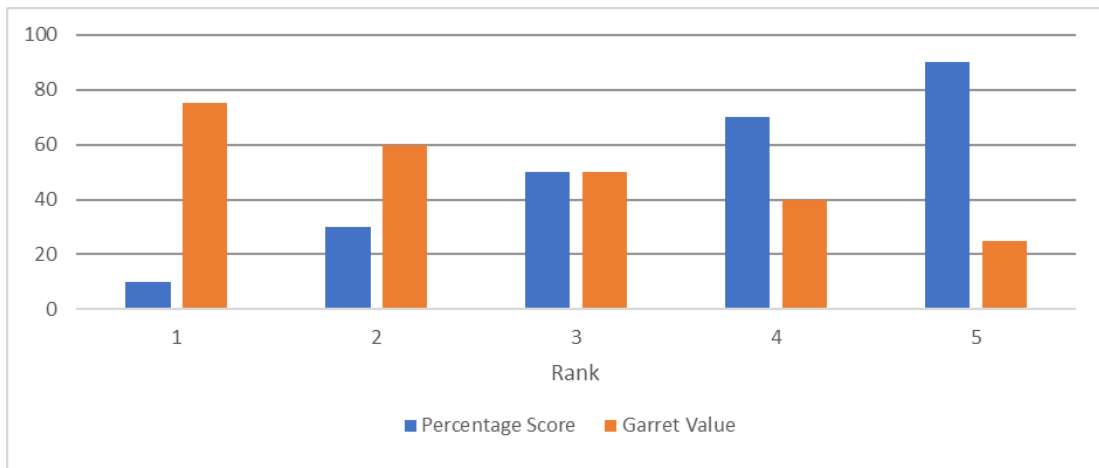


Figure 5-3: Garret value for each percentage score

Number of responses for each rank under each quality measure which are presented in Figure 5-2 was multiplied with the Garret value for each rank which are presented in Figure 5-3. Then each multiplied values of each information source were added together. Thereafter the ranks were calculated according to the values of the total. Table 5-9 shows the computed rank of each information source obtained from the above calculation under each quality measure. Five is taken as the highest rank, and one is taken as the lowest to facilitate further analysis.

Table 5-9: Computed rank values for each information source for every quality measure.

	Calculated rank under each quality measure		
	Accuracy	Usefulness	Timeliness
Government	5	4	3
Non-Government	3	2	1
News Media	4	5	5
Influencers	2	3	4
Community Groups	1	1	2

Furthermore, in this study, the best information source was selected by considering all three quality measures: accuracy, usefulness, and timeliness. The Multicriteria Decision Analysis method was used to conduct that, which is a science and art of designing or choosing different alternatives [298]. To conduct the Multicriteria decision analysis, decision matrix should be developed. Since the decision space is finite, this multicriteria decision problem can be classified as a discrete case [298]. Simple Additive Weighting (SAW) method was used to solve discrete multicriteria decision problems [299]. Here, relative importance weights for all criteria should be specified. To calculate the weights for each quality measure, Rank-Order Centroid Technique, which is a Direct Weight Elicitation Technique was used [300]. Quality measures should be ranked from the most to least important to perform this. A ranking question was included in the questionnaire where the respondents were asked to rate the importance of the quality measures. By using Henry Garrett analysing technique, the importance levels of the quality measures were calculated. Accuracy, usefulness,

and timeliness were ranked first, second, and third, respectively. Subsequently, the Rank Sum weighting scheme was used to calculate the weightage using Rank-Order Centroid Technique [301]. Equation 4 presents the equation used in the Rank Sum weighting scheme.

$$wt_i = \frac{K - r_i + 1}{\sum_{j=1}^K K - r_j + 1} \quad (4)$$

Where:

r_i is the rank of the i^{th} objective

K is the total number of objectives

Weights were obtained as 0.5, 0.33, and 0.17 for Accuracy, Timeliness and Usefulness, respectively. The decision matrix was developed to prioritise the information sources under all three quality measures by considering the ranks in Table 5-9 and the weights calculated for each quality measurement. Results are presented in Table 5-10.

Table 5-10: The determination of weighted averages and the subsequent calculation of priorities for information sources

Quality Measure	Weight	Government	Non-Government	News Media	Influencers	Community Groups
Accuracy	0.50	$5 \times 0.5 = 2.5$	1.5	2	1	0.5
Timeliness	0.33	0.99	0.33	1.65	1.32	0.66
Usefulness	0.17	0.68	0.34	0.85	0.51	0.17
Weighted Average	-	4.17	2.17	4.5	2.83	1.33
Priority	-	2	4	1	3	5

Results of the above analyses show that the news media have been considered the foremost information source on social media by the respondents in receiving high-quality disaster-related information in terms of accuracy, timeliness and usefulness. Government sources have been ranked second. Influencers, Non-governmental and Community group information sources are in the third, fourth, and fifth places, respectively.

5.1.2.7. Qualitative Outcomes of the Questionnaire

The participants were instructed to offer feedback on the existing shortcomings and challenges they have faced while using social media for communication related to disasters. In addition, the participants were asked to express their recommendations and perspectives, thereby making a valuable contribution to enhancing social media strategies for disaster-related communication among the Sri Lankan population. The feedback and suggestions have been systematically arranged and presented in a tabular structure, specifically in Table 5-11, with the purpose of offering a lucid representation of the present status of employing social media for communication in times of disasters.

Table 5-11: Various existing gaps and barriers, as well as provided suggestions for improvement. identified by the respondents

Existing Gaps and Barriers	Suggestions as Remedial Measures
Spreading of Misinformation	Sharing verified information faster than rumours. Improving the accuracy of the information using a visual and graphical representation. Improving the utilising of social media by the more responsible government organisations. Introducing more burdensome regulations and creating a centralised government system to quickly disseminate accurate information for big community. Improving the comprehension of the information using a visual and graphical representation. Providing detailed information. Improving the practice of social media by the more responsible government organisations. Having a good understanding of the community requirement

Lack of internet facilities	Engaging more tech-savvy with real-time response tools
Lack of digital literacy	Using as a secondary source for education/ awareness outreach to redirect people to primary sources to educate and mobilise for the response. Better sponsoring the disaster management-related social media as it will automatically pop up in everyone's feed easily
Not suitable for night-time (when people are asleep)	Implementation of an alert system (with relevant colour code for visual identification) supported by an audible and vibrational alarm

5.1.3. Application of Structural Equation Modelling (SEM)

Various statistical techniques were used to evaluate the general non-influenced Sri Lankan community's behaviour regarding utilising social media throughout disasters. Therefore, various dependent and independent variables were used throughout this study to explore this particular behaviour of the Sri Lankan non-influenced general community. In each of statistical technique, a factor was measured that cannot be measured directly. The variables that cannot be measured directly were measured indirectly using several other measurable variables. Usually, those variables are called “Latent Variables”, while the variables required to measure the latent variables are called “Indicators” or “Measurements” [302].

Moreover, it was observed that there are relationships between the several latent variables considered for this study. Therefore, a technique was required to measure the relationships between multiple latent variables. To accomplish this objective, the researchers employed the Structural Equation Modelling (SEM) technique, which aided in the construction of models that elucidate the connections between observed and unobserved variables, as well as the relationships among the unobserved variables [303].

5.1.4. Structural Model and Instrument

Through the present study, eight major latent variables that have relationships with each other were recognized. To develop the structural model for the present study, seven of these variables were selected as dependent latent variables, and one was selected as the independent latent variable. Table 5-13 presents the selected latent variables and the measured indicators.

In order to use the structural equation modelling technique for this study, SmartPLS version 3 software was used, which is a milestone in latent variable modelling [304]. Structural equation models can specify multifaceted interrelationships between known and latent variables. Partial Least Squares, also known as PLS structural equation modelling (PLS-SEM) or PLS route modelling, is a popular method for estimating such models [305], [306]. SmartPLS software, a licensed and exclusive software package with a graphical user interface for running PLS-SEM analyses, was introduced in 2005 and achieved a tremendous influence. SmartPLS 2 is notable for its ease of utilisation, the ability to do basic PLS-SEM studies, and the fact that it is free. SmartPLS 3 [307] is commercial software that offers a far greater range of modelling and algorithmic possibilities, enhanced usability over earlier versions, and professional assistance almost 15 years later.

Table 5-12: Specific set of latent variables and their corresponding measured indicators

Latent Variable Type	Name of the Latent Variable	Measured Indicators
Dependent	Utilising of Social Media by the Government Stakeholders (GS)	Value of Disaster-Related Information by the Selected Five Government Organizations
	Use of Social Media by the Non-Government Stakeholders (NGS)	Value of Disaster-Related Information by the Selected Five Non-Government Organizations
	Utilising of Social Media by the Media Stakeholders (MS)	Quality of Disaster-Related Information by the Selected Five Media Institutions
	Utilising of Social Media by the Community Groups (CG)	Quality of Disaster-Related Information by the Selected Five Community Groups
	The Utilisation of Social Media by Influential individuals (IS)	Quality of Disaster-Related Information by the Selected Five Community Groups
	Use of Different Social Media platforms for Disaster-Related Information (SP)	Use preference on the application of five social media applications for disaster-related information sharing in Sri Lanka
	Timeliness of Disaster-Related Information on Social Media (TS)	Timeliness of the information provided by each user category who utilised social media throughout disasters

	The Usefulness of Disaster-Related Information on Social Media (US)	The usefulness of the information provided by each user category who used social media during disasters
	Accuracy of Disaster-Related Information on Social Media (AS)	Accuracy of the information provided by each user category who utilised social media throughout disasters
Independent	Preference for the utilising of social media throughout disasters by the ordinary public in Sri Lanka (PUS)	Receiving of any disaster-related information via social media applications at present

5.1.5. Results of the Structural Equation Modelling

The researchers in this study deemed a Cronbach's alpha coefficient of 0.70 or higher to be the threshold for acceptable reliability and consistency [308]. The alpha coefficient values for the eight latent constructs were reported as follows: GS (0.72), NGS (0.74), MS (0.70), CG (0.71), IS (0.76), SP (0.75), TS (0.72), US (0.81), and AS (0.74), indicating satisfactory levels of internal consistency. According to the quality criteria, the Chi-Square test is considered. During the process of model evaluation, it was observed that the incremental fit indices exhibited high values and tended to indicate a close approximation to a perfect fit, in contrast to the absolute fit indices. The chi-square test ($\chi^2 = 1245$, $df = 190$) yielded a statistically significant result at a significance level of $p < 0.001$. Nevertheless, due to the potential sensitivity of the χ^2 test to sample size, the Root-Mean-Square Error of Approximation (RMSEA) was employed as an alternative. A root mean square error of approximation RMSEA value below 0.08 indicates a robust fit of the model [309]. Consequently, the obtained Root Mean Square Error of Approximation (RMSEA) value of 0.065 in the present study signified that the collected data exhibited congruence with the proposed model. Subsequently, the data and structural model were assessed accordingly.

In this study, the path analysis technique was employed to examine the impact of the specified independent variables on the dependent variable. The statistical significance of all parameter estimates for the measurement variables was observed at a significance level of $p < 0.001$. The standardised estimates of the structural model, which encompass the causal relationships among the latent constructs, are depicted in Figure 5-4. In the process of assessing the causal path relationship, it was found that eleven path relationships were statistically validated, while all path relationships were included in the analysis. To provide further elucidation, this section has examined three distinct path relationships. The path relationship between the use of different social media platforms and government sources is found to be statistically significant and positively correlated, with a beta coefficient of 0.83 ($t = 7.00$, $p < 0.001$). This observation suggests that the use of different social media platforms for disaster-related communication in Sri Lanka is influenced in a positive manner by government

sources. The utilisation of various social media platforms by government entities has a notable impact on enhancing the efficacy of social media usage in times of national emergencies. Similarly, the incorporation of various social media platforms by supplementary entities will enhance the efficacy of social media practises in the context of disaster management in Sri Lanka. Moreover, it is possible to identify and establish further causal pathways that can elucidate the prevalence of social media utilisation in Sri Lanka during catastrophic events.

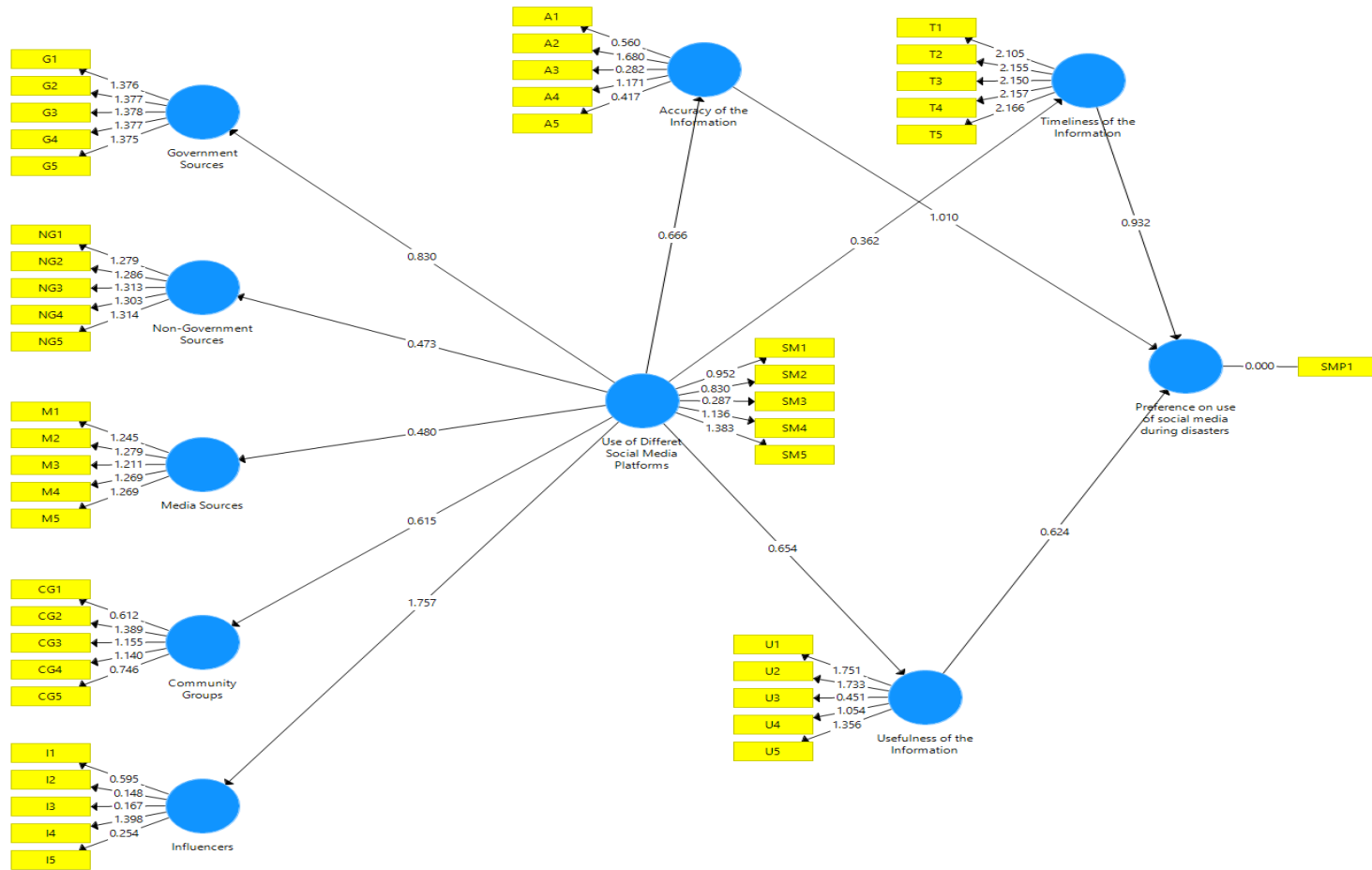


Figure 5-4: Computed standardised estimates of the structural equation model

5.2. Analysis of Disaster-Related Social Media Usage by Social Groups

The study conducted by [87] has identified a cohort of social media users who actively participate in disaster-related activities on various social media platforms. Social groups have been acknowledged as important stakeholders in the utilisation of social media platforms. They bear the responsibility of effectively disseminating information related to disasters to populations that are vulnerable due to a range of factors. Stakeholders in the field of disaster risk management can be defined as individuals who actively participate in disaster risk reduction and management processes [61]. Numerous societal entities, such as clubs, associations, philanthropic organisations, volunteers, and researchers, are employing social media platforms to effectively tackle and provide timely responses to disasters.

This section encompasses two case studies that exemplify the utilisation patterns of two prominent social media platforms for communication pertaining to disasters within social clusters in Sri Lanka. The primary aim of the initial case study is to examine the strategies utilised by a professional social organisation in the administration of a dedicated Facebook page for disaster communication. To facilitate this investigation, two methodologies were utilised. The primary objective was to collect data from Facebook insights to assess the effectiveness of a specific Facebook page and compare it with the level of engagement among the Sri Lankan community in using online platforms for sharing disaster-related information. In addition, the chosen Facebook page was examined in order to establish a communication network specifically related to disasters. The methodology employed in this study involved the application of social network analysis to examine the different components of the network.

In the second case, the behaviour of the using the WhatsApp platform by the community groups in Sri Lanka was explored. Several findings were obtained through the analysis, and especially the language affection was explored. Therefore, language problem in Tamil speaking community during the COVID-19 period was analysed in the second case.

5.2.1. Case Study I: Investigating the Facebook page of Disaster Info Sri Lanka

Based on available reports, it can be inferred that Facebook holds the dominant position as the most extensively utilised social media platform in Sri Lanka [217]. The Sri Lankan populace has a longstanding tradition of utilising social media platforms to pursue diverse objectives. The utilisation of social media platforms by the Disaster Risk Management community is employed as a means to distribute information pertaining to disasters [220]. Amidst the widespread outbreak of the COVID-19 pandemic in Sri Lanka, there was a notable surge in the preference of individuals residing in the country to rely on online resources, particularly social media platforms, as their primary means of accessing information related to the disease. As a result, a group of researchers specialising in engineering undertook the creation of the "Disaster Info Sri Lanka" Facebook page in order to address the information requirements of the general public. The Facebook page has consistently received a regular stream of articles related to disasters, as well as news updates specifically related to the COVID-19 pandemic, since its establishment. The main purpose of creating this Facebook page is to efficiently and accurately disseminate relevant information regarding disasters. As of October 2021, the page had accumulated a total of 5277 followers and 5140 likes, a quantity deemed appropriate for analysis based on previous scholarly investigations [310]. The page insight data provided information regarding the demographic characteristics of the audience that accessed the Disaster Info Sri Lanka page. When compared to other communities, it has been observed that individuals between the ages of 25 and 34 have demonstrated a greater propensity for engaging with the Disaster Info Sri Lanka Facebook page.

Furthermore, the demographic groups aged 18-24 and 35-44 have subsequently participated in the study, ranking second and third in terms of engagement. Upon analysing the communal emphasis on utilising social media for disaster-related communication, as demonstrated by the research conducted by [311], it becomes apparent that this engagement exhibits a significant degree of comparability.

The online population of Disaster Info Sri Lanka primarily consists of the younger demographic in Sri Lanka. As mentioned earlier, the Disaster Info Sri Lanka Facebook page has distributed a wide variety of materials related to disasters. Therefore, a comprehensive classification of post publishing was undertaken, encompassing 13 discrete categories. This classification considered multiple factors, including the temporal aspect of post publication and the nature of the hazard. The implementation of this categorization was undertaken to enhance the analysis carried out in this study. The primary objective of this classification is to enhance the efficiency of the subsequent analysis conducted in this study, which specifically examines the network behaviour of Disaster Info Sri Lanka. The analysis is conducted using the posts that were published within the specified time frame.

- a) Awareness Information (About various on time disasters)
- b) Morning COVID-19 Report
- c) Evening COVID-19 Report
- d) Morning Weather Report
- e) International COVID-19 Report
- f) Landslide Advisory
- g) Cyclone Advisory
- h) Earthquake Advisory
- i) Flood Water Level
- j) Anthropogenic Hazards and Disasters
- k) Miscellaneous Weather Update
- l) Sun Path Movement and Temperature Variation
- m) (Other) Picture Posts/ Memes/ Cartoons

The present study investigated Facebook Insights, a comprehensive analytics dashboard designed to monitor user behaviour and assess post-performance on a Facebook business page. Furthermore, the platform not only offers essential analytics such as page views and post reach for both paid and organic posts, but it also supports the endorsement and tracking of competitor pages. The data

pertaining to page insights was acquired during the timeframe spanning from March 20, 2020, to October 31, 2021. The performance of the Disaster Info Sri Lanka Facebook page was assessed over time by obtaining five distinct parameters from the page insight data. Each parameter possesses a distinct definition, as indicated below, that delineates its manner of assessing the temporal performance of the Facebook page.

5.2.1.1. Daily Page Engaged Users

The metric "Daily Page Engaged Users" pertains to the quantity of individuals who interacted with the Facebook Page. Engagement encompasses all instances of user interaction, such as clicks or the creation of stories, by unique individuals. Figure 5-5 presents a visual representation of the daily tally of active users on the Disaster Info Sri Lanka Facebook page, encompassing the timeframe from March 2020 to October 2021.

5.2.1.2. Daily Total Reach

The quantity of individuals who encounter any form of content originating from the Facebook page or pertaining to the page on their electronic display. This encompasses various forms of content such as posts, check-ins, advertisements, and social data generated by individuals who engage with the Page (distinct users). Figure 5-6 depicts the cumulative daily reach attained by the Disaster Info Sri Lanka Facebook page during the period from March 2020 to October 2021.

5.2.1.3. Daily Viral Reach of Page Posts

The quantity of individuals who possess social media accounts that are specifically dedicated to engaging with any of the posts on the Facebook page that are visible on their screen. The dissemination of social information occurs naturally when a friend actively engages with a specific page or post. This phenomenon occurs when an individual demonstrates their preference for a Facebook page by actively participating in a range of activities, including liking,

following, engaging with posts, sharing photos, and accessing the page. These actions are ascribed to distinct users. Figure 5-7 depicts the daily viral reach of the Disaster Info Sri Lanka Facebook page from March 2020 to October 2021.

5.2.1.4. Daily Total Impressions of the Posts

The frequency with which the posts on the page were displayed on an individual's screen. The posts encompass a variety of content types, such as statuses, photos, links, videos, and other forms of media, with a cumulative count. Figure 5-8 illustrates the aggregated daily impressions of the posts disseminated on the Disaster Info Sri Lanka Facebook page during the timeframe from March 2020 to October 2021.

5.2.1.5. Daily Total Consumers

The quantity of individuals who engaged with any of the content by means of clicking. Stories that are generated without the user engaging with page content, such as liking the page from the timeline, are excluded from the count of unique users. Figure 5-9 depicts the cumulative daily user count of the Disaster Info Sri Lanka Facebook page, encompassing the period from March 2020 to October 2021.

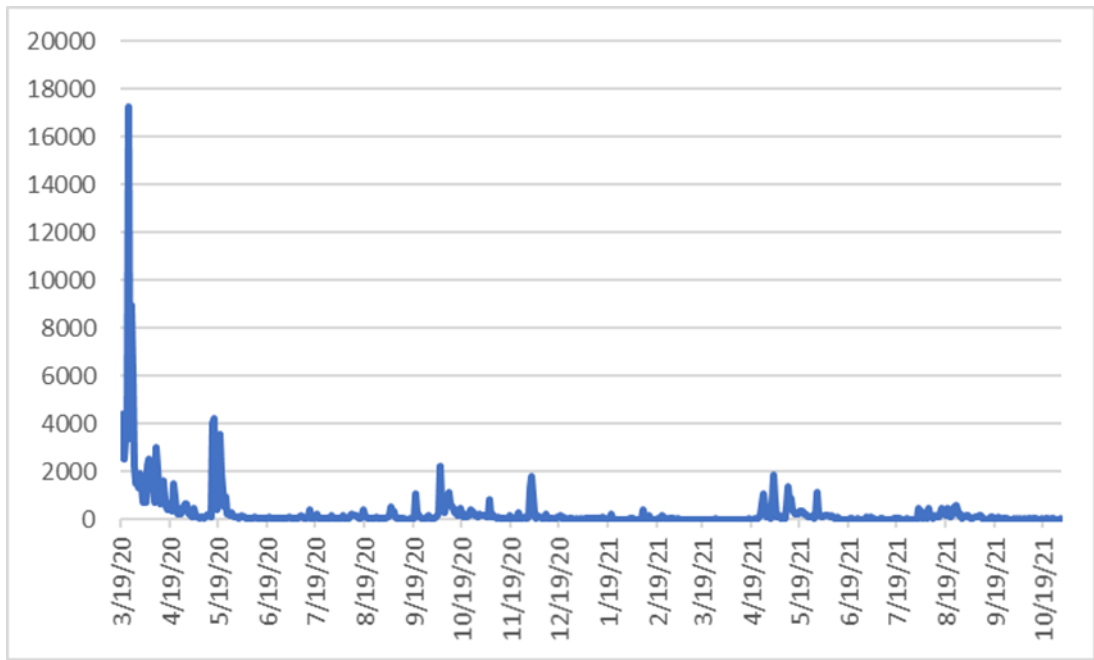


Figure 5-5: Daily engagement levels of users on the Disaster Info Sri Lanka Facebook page

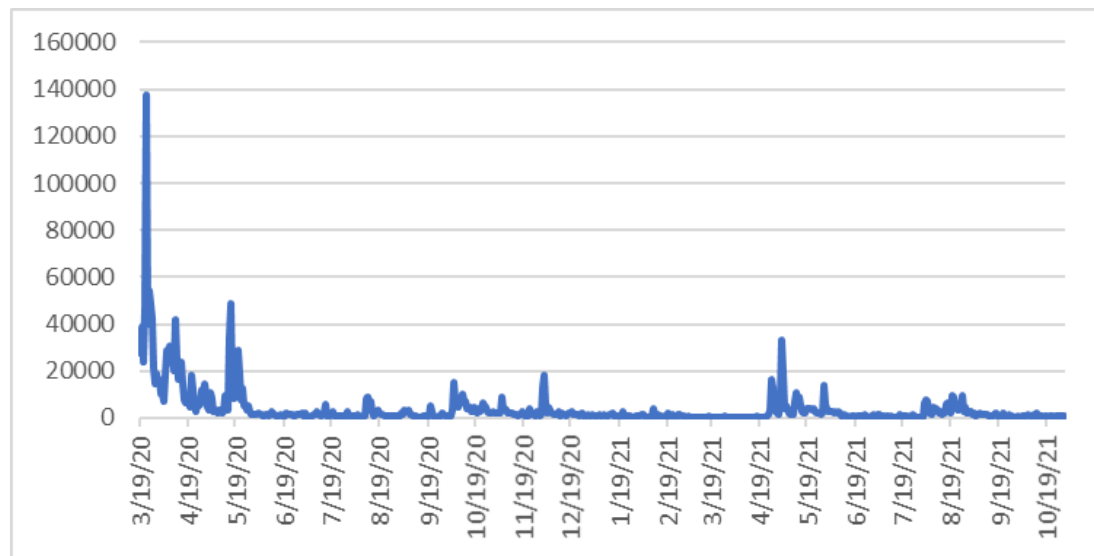


Figure 5-6: Aggregate daily reach of the Facebook page "Disaster Info Sri Lanka"

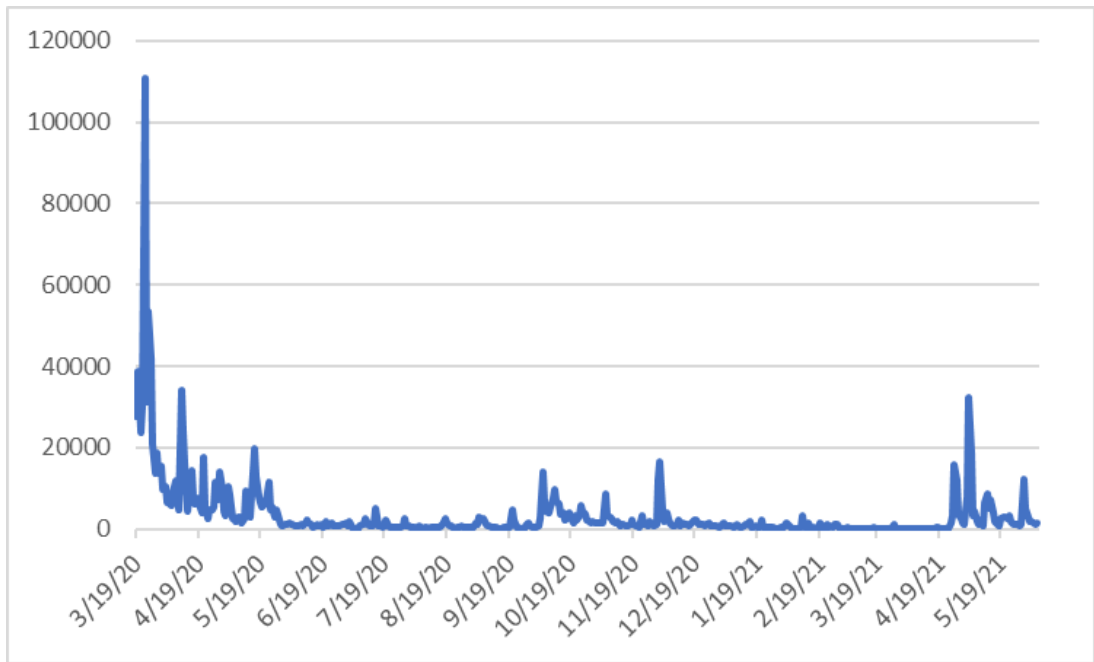


Figure 5-7: Daily extent of viral dissemination achieved by the page posts on the Disaster Info Sri Lanka Facebook page

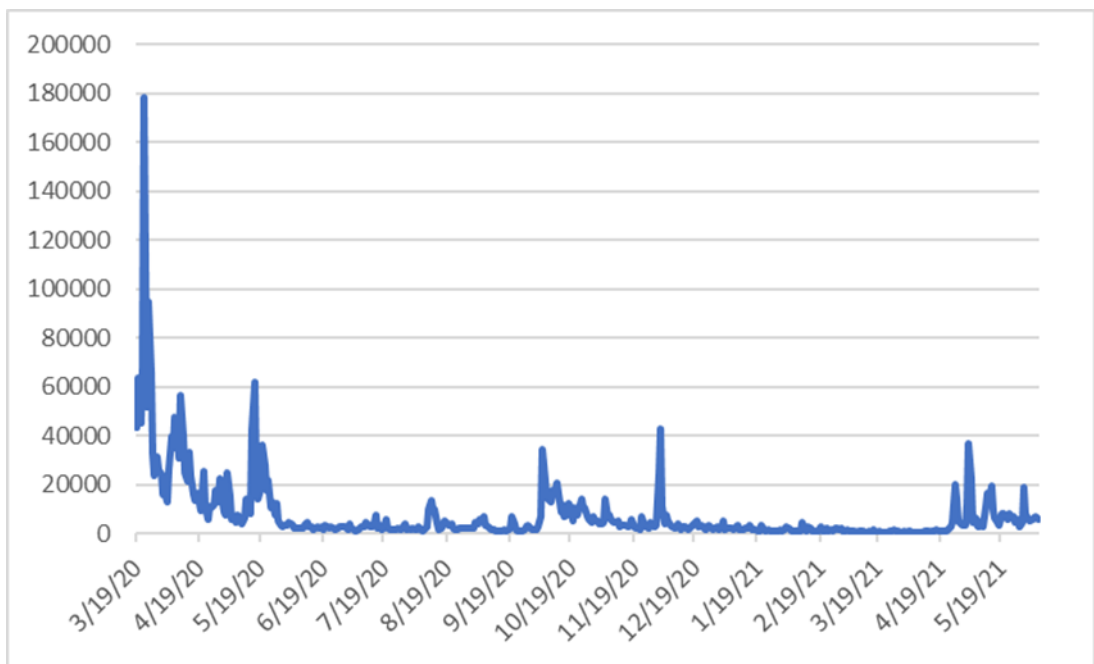


Figure 5-8: Aggregate number of impressions received by the posts on the Facebook page of Disaster Info Sri Lanka on a daily basis

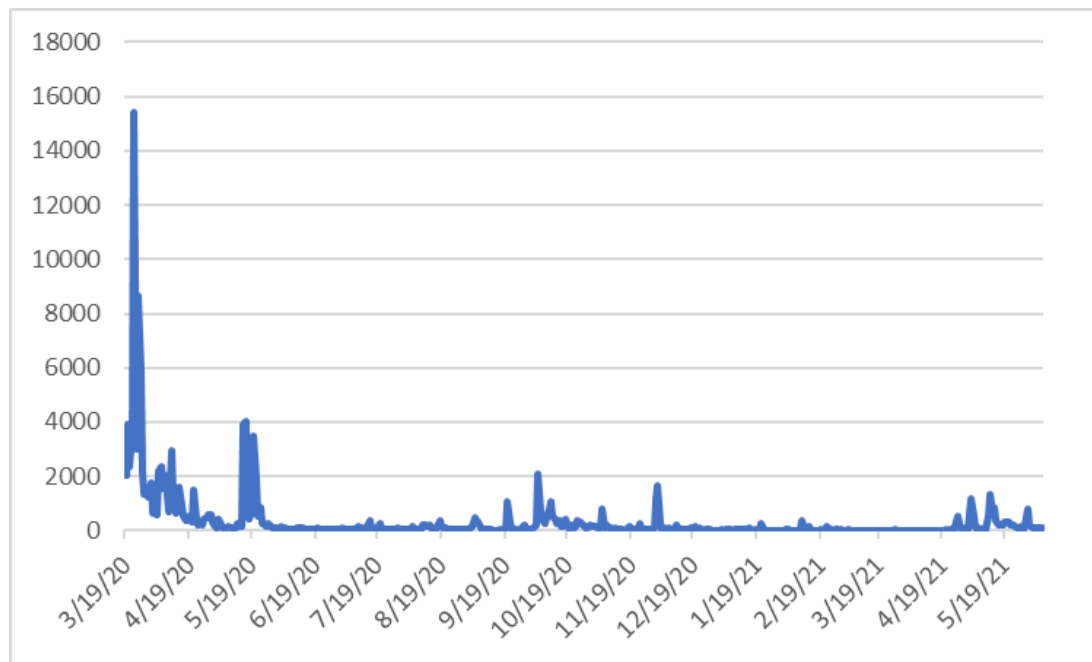


Figure 5-9: The number of individuals who access the Disaster Info Sri Lanka Facebook page on a daily basis

Every parameter being examined displays a similar level of variability. In the early stage of the COVID-19 pandemic, it is evident that each graph exhibits considerable variability, indicating a substantial degree of community engagement with the Disaster Info Sri Lanka Facebook page. The primary cause of the observed discrepancy can be attributed to the community's significant preference for utilising social media and other online resources to obtain supplementary information about the coronavirus during the early stages of the epidemic in Sri Lanka. Following the initial surge of COVID-19 cases in Sri Lanka, there was a discernible reduction in the graphical depictions of diverse parameters, indicating a gradual decline in the extent of public involvement with the Disaster Info Sri Lanka Facebook page. However, it is important to acknowledge that each graph demonstrates a similar, gradual increase in variability over various time periods. The increase in activity that has been observed indicates a greater level of interaction between the general population and the Disaster Info Sri Lanka Facebook page in response to the subsequent waves of the COVID-19 outbreak in Sri Lanka. This highlights the importance of the Disaster Info Sri Lanka Facebook page during the crucial phase of the COVID-19 pandemic in Sri Lanka.

A comparative analysis was conducted to assess the extent of community engagement with the Disaster Info Sri Lanka Facebook page in relation to the overall level of community engagement with utilising internet-based resources for accessing disaster-related information. The assessment of community engagement with the Disaster Info Sri Lanka page involved considering the extent of its reach on Facebook. Within the context of a Facebook page, the term "reach" pertains to the comprehensive count of individuals who have accessed any form of content on the Page, encompassing posts, stories, and other information generated by page users. The concept of a post's reach can be distinguished from its impressions by considering that a single user may have multiple views of the post [312]. Figure 5-10 depicts the level of audience engagement observed on the Disaster Info Sri Lanka Facebook page from March 2020 to October 2021.

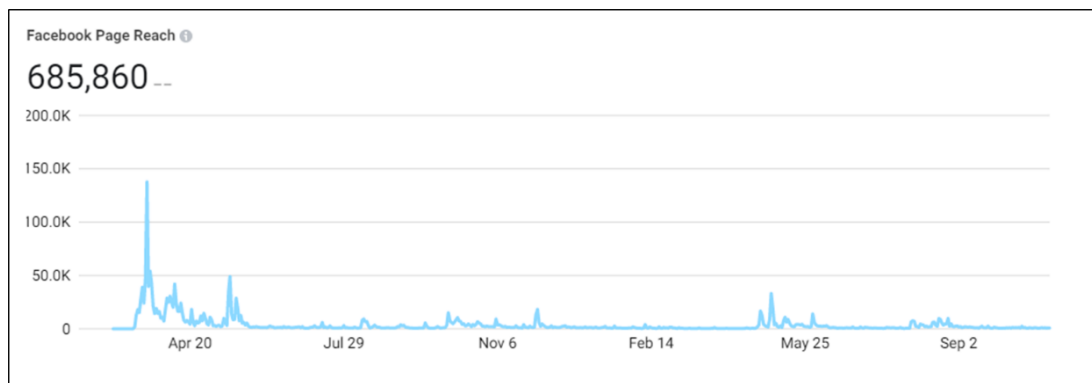


Figure 5-10: Extent of the reach of the Disaster Info Sri Lanka Facebook page during the period spanning from the month of March 2020 to October of 2021.

The utilisation of the Google Trends tool was employed to monitor the manner in which the broader populace accessed internet-based resources for the purpose of obtaining information pertaining to calamities. The presented functionality exhibits the relative occurrence of a particular search query inputted into Google's search engine, relative to the overall number of searches conducted on the platform within a designated period [313]. The utilisation of internet-based facilities by the community has exhibited an increase compared to previous periods, as evidenced by this study conducted amidst the COVID-19 pandemic

[314]. According to the data presented in Figure 5-11, it is evident that the term "coronavirus" has gained significant prominence as the most widely searched term worldwide, as indicated by Google Trends.

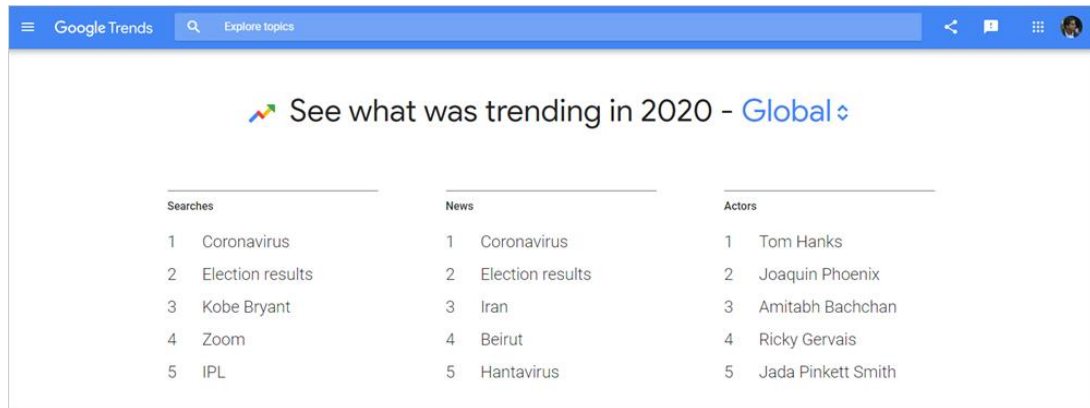


Figure 5-11: Search term trending list in Google in 2020

Hence, to facilitate a comparative examination of the Facebook page under scrutiny, the Google search-term trend for the keyword "Coronavirus" was taken into account. This trend offers valuable insights into the extent of public interest over a designated timeframe. Furthermore, Figure 5-12 depicts the temporal trajectory of the search term trend, specifically highlighting the degree of public interest in the term "Coronavirus" as it evolves over time.



Figure 5-12: Search term trend of the term "Coronavirus"

In order to investigate the relationship between the behaviour of Facebook page reach and the overall engagement of the community in utilising internet-based platforms for disaster-related information, two graphs were analysed for each of the two variables. The process of creating Figure 5-13 entailed combining two necessary graphs in order to facilitate comparison.

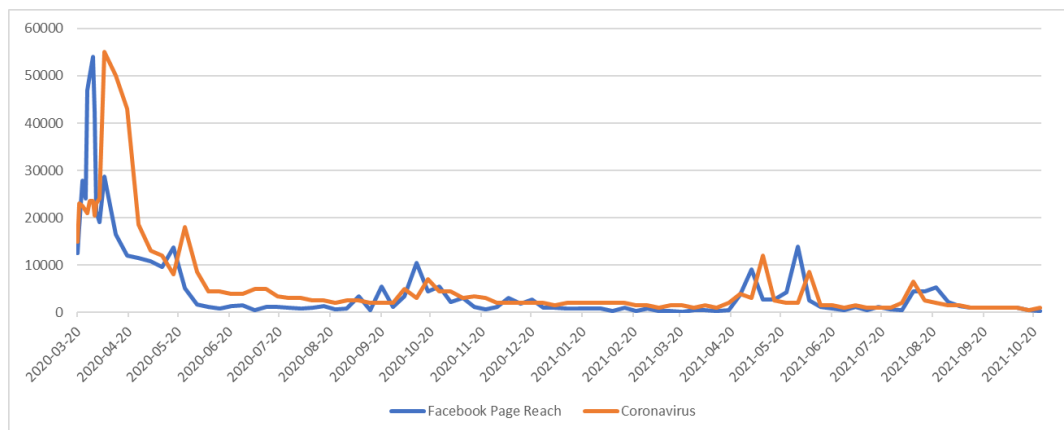


Figure 5-13: The fluctuation in the reach of Facebook pages and the utilisation of the search term "Coronavirus"

The time frame under consideration for this comparative analysis was from March 20, 2021, to October 31, 2021. The vertical direction represents the level of interest as it changes over a period of time, while the horizontal axis represents the chronological progression for both charts. To improve the accuracy of the observation, the interest values over time for the search term "coronavirus" were uniformly scaled.

5.2.2. Investigating the community network of Disaster Info SL

The research utilised the Social Network Analysis methodology to investigate the effectiveness of the communication network structure established through audience engagement with the Disaster Info Sri Lanka Facebook Page. The data collection procedure was implemented using the Facepager Software. The software application mentioned above has been developed with the purpose of enabling the automated extraction of data from the internet [315]. The Facepager software was employed to extract essential information related to the published posts, such as the post description, share count, reaction count, and comment count. Each individual post on the Facebook page was assigned a numerical identifier "Px", where "x" represents the specific post number. The implementation of this numerical system was utilised in order to facilitate the analysis of this particular segment. The efficacy of the data collection procedure was constrained by the privacy policies implemented by the social media platforms. Hence, the present study primarily concentrated on utilising the Facepager software to exclusively analyse publicly accessible data. The Gephi Open-Source Software was utilised to execute the network visualisation process, which entailed the identification of nodes and edges. The utilisation of this software is widespread in the analysis of intricate models, particularly in the domains of graphical and network analysis. Data analysts possess the capacity to proficiently discern patterns and trends, detect anomalies, and interpret data through the utilisation of their inherent cognitive faculties [316].

The visual representation of the Disaster Info Sri Lanka Facebook page is depicted in Figure 5-14. The methodology employed in this study necessitated

the incorporation of posts disseminated on the official Facebook page of Disaster Info Sri Lanka for the purpose of mapping the communication network. Hence, the term "nodes" encompasses both the primary posts published on the Facebook page and the secondary posts shared on the Disaster Info Sri Lanka Facebook page. The process of identifying edges was based on the classification of posts into separate categories and assessing their level of connection with the shared posts. The current model under evaluation comprises a total of 3061 nodes and 39836 edges. The maximum geodesic distance, also known as the diameter, is found to be 4. This value indicates that the maximum degree of connectivity between any two vertices in the network is 4. The mean number of nodes that establish connections between two vertices is 2.40. The Yifan Hu Proportional layout algorithm was employed to establish the directed network structure.

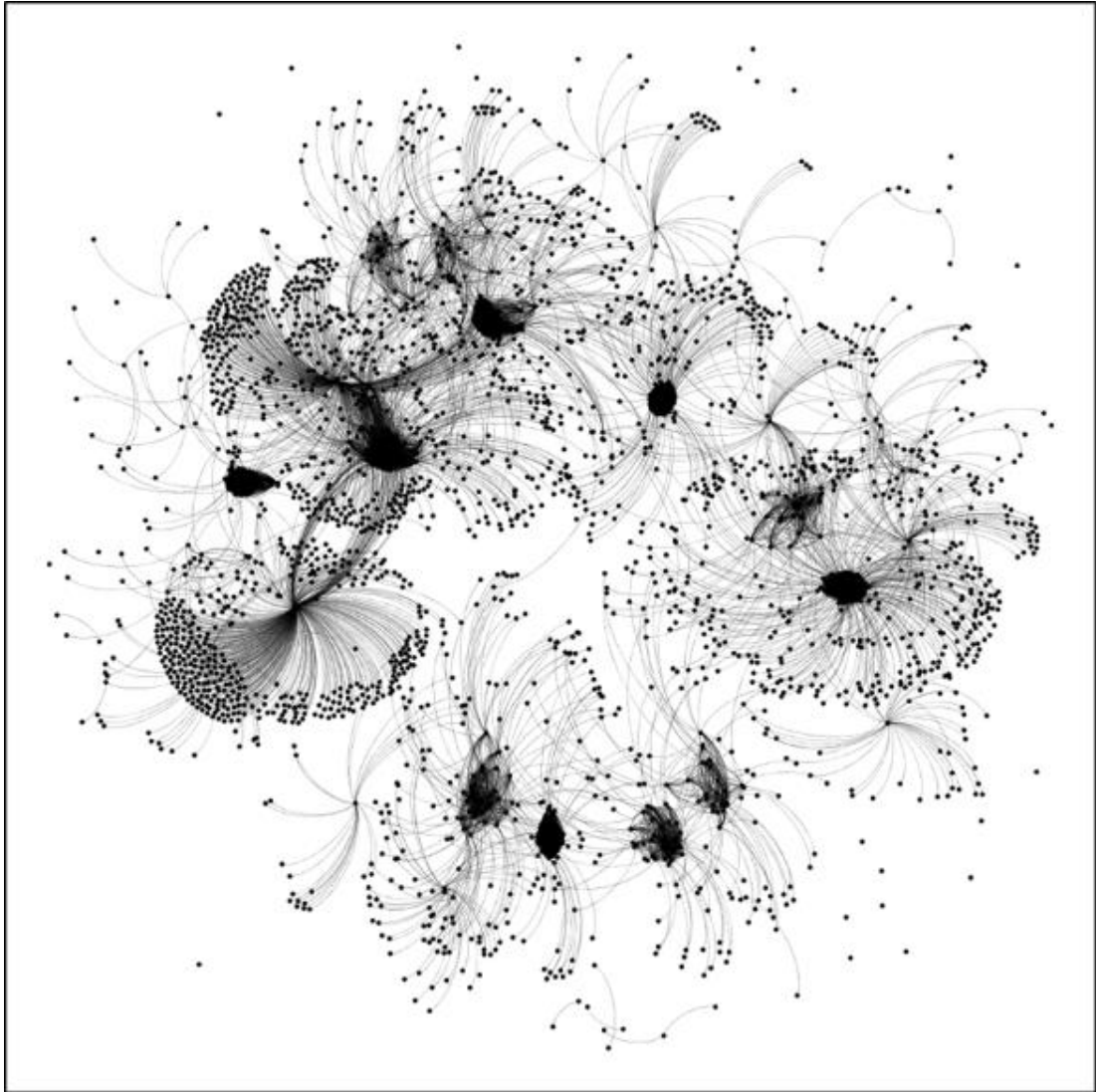


Figure 5-14: Visualisation of Disaster Info Sri Lanka Facebook page post-transmission network behaviour

The software yielded four primary centrality parameters for each node, namely Degree Centrality, Betweenness Centrality, Closeness Centrality, and Eigenvector Centrality. The discussion section of this chapter provides definitions for each parameter. Four distinct posts were depicted based on the parameter with the greatest value in each case. The posts on the page were identified as the primary centralised positions, as depicted in Table 5-13.

Table 5-13: Featured several prominent centralised posts

Key Centralized Posts	
<i>Centrality Parameter</i>	<i>Node/Post Number</i>
Degree Centrality	289
Betweenness Centrality	289
Closeness Centrality	297
Eigenvector Centrality	18

Based on the data provided in Table 5-14, it is evident that the P289 Node, representing post number 289, has attained the highest values for both Degree Centrality and Betweenness Centrality. The data mentioned earlier is graphically depicted in Figure 5-15. The following text presents a concise overview of the P289 node.

- P289 – Post Number 289
- Type of the Post - Awareness Information
- Description of the Post - Accusation made by MOH (Medical Officer of Health) pertaining to the lifting of COVID-19 epidemic limitations that were enforced in the Piliyandala area
- The total number of shares is 364
- The total number of reactions observed in the study was 63
- The total number of comments is two

The P297 Node, representing post number 297, has attained the highest level of Closeness Centrality. Below is a concise summary of post number 297.

- According to P297, which refers to Post Number 297
- P297 Type of the Post - Other
- Description of the Post - Picture post about the tragic situation of the COVID-19 pandemic, which illustrates the inconveniences caused by the large number of deaths due to coronavirus infection
- The total count of shares is 38
- The total number of reactions observed in the study was 19

- The count of comments is zero

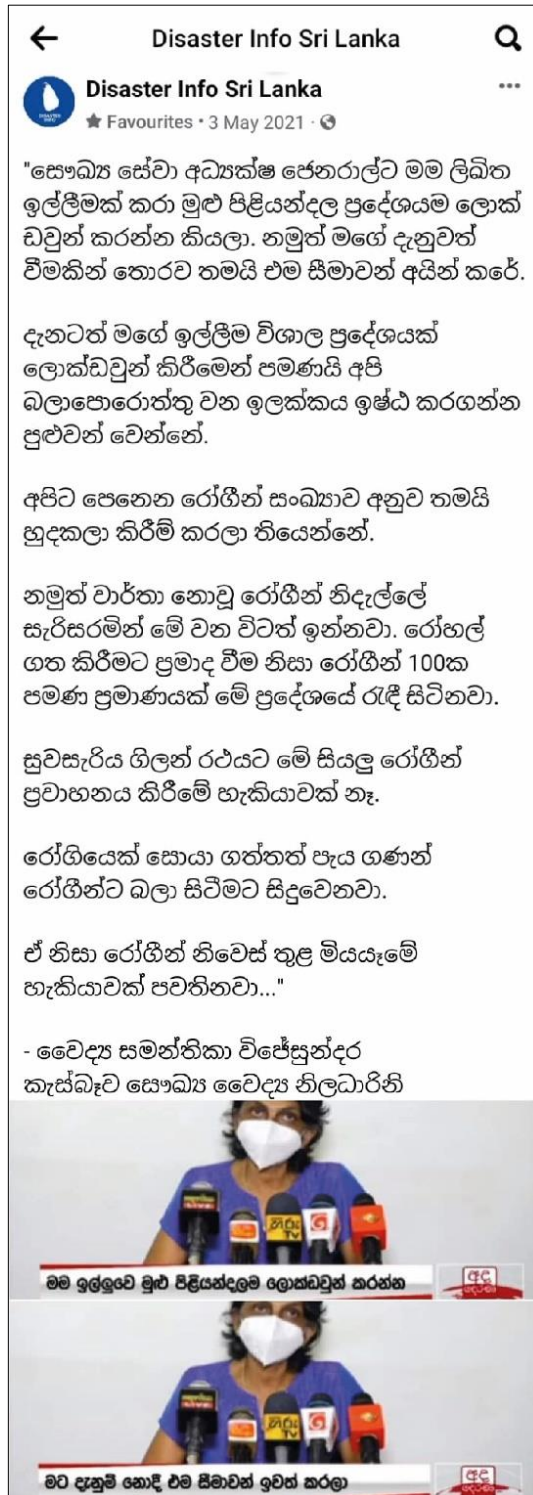


Figure 5-15: The 289th Disaster Info Sri Lanka Facebook post

The P18 Node, denoting the 18th post, has achieved the maximum Eigenvector Centrality, as illustrated in Figure 5-16. The following is a succinct summary of post number 18.

- P18 refers to Post Number 18
- P297 Type of the Post–Morning Weather Update
- The following is a depiction of the weather forecast for June 3. The accompanying visual representation is complemented by a written description.
- The total amount of shares is three
- The total number of reactions observed was five
- The count of comments is zero

Disaster Info Sri Lanka ★ Favourites · 1 d · 🌐

🚨 ඉදිරි කාලගුණ තත්වය පිළිබඳව යාවත්කාලීන කිරීම.

▶ 2022 අප්‍රේල් මස 30 දින සඳහා කාලගුණ අනාවැකිය, 2022 අප්‍රේල් මස 30 දින උදෑසන 05.30 ට නිකුත් කරන ලදී.

▶ බස්නාහිර, දකුණ, සබරගමුව, මධ්‍යම සහ ඌව පළාත්වලත් මඩකලපුව සහ අම්පාර දිස්ත්‍රික්කවලත් සවස් කාලයේදී හෝ රාත්‍රී කාලයේදී තැනින් තැන වැසි හෝ ගිගුරුම් සහිත වැසි ඇතිවේ.

▶ සෙසු ප්‍රදේශ වල ද සවස් කාලයේදී හෝ රාත්‍රී කාලයේදී ස්ථාන ස්වල්පයක වැසි හෝ ගිගුරුම් සහිත වැසි ඇතිවේ.

▶ බස්නාහිර, සබරගමුවසහ මධ්‍යම පළාත්වලත් ගාල්ල සහ මාතර දිස්ත්‍රික්කවලත් ඇතැම් ස්ථාන වලට 75 mm ට වැඩි තරමක් තද වැසි ඇතිවිය හැක.

▶ බස්නාහිර පළාතේ සහ ගාල්ල, මාතර සහ පුත්තලම දිස්ත්‍රික්කවල වෙරළබඩ ප්‍රදේශවල උදෑසන කාලයේදීත් වැසි ස්වල්පයක් ඇතිවේ.

▶ ගිගුරුම් සහිත වැසි සමග ඇතිවිය හැකි තාවකාලික තද සුළං වලින් සහ අකුණු මගින් සිදු වන අනතුරු අවම කර ගැනීමට අවශ්‍ය පියවර ගන්නා ලෙස ජනතාවගෙන් කාරුණිකව ඉල්ලා සිටිනු ලැබේ.

මූලාශ්‍ර:
කාලගුණ විද්‍යා දෙපාර්තමේන්තුව
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ඉදිරි කාලගුණ තත්වය පිළිබඳ යාවත්කාලීන කිරීම

• 2022 අප්‍රේල් මස 30 දින සඳහා කාලගුණ අනාවැකිය, 2022 අප්‍රේල් මස 30 දින උදෑසන 05.30 ට නිකුත් කරන ලදී.

ස්ථාන

- සබරගමුව සහ සබරගමුව ප්‍රදේශයේ, සාදා සහ මාතර ප්‍රදේශයේදී වරින් වර වැසි ඇතිවේ.
- සහන සැපයීම සඳහා සහ ප්‍රාදේශීයවලත් සවස් කාලයේදී හෝ රාත්‍රී කාලයේදී ස්ථාන වෙනස්වන වැසි හෝ ගිගුරුම් සහිත වැසි ඇතිවිය හැක.

- උෞච්ච ප්‍රදේශ
- සබරගමුව ප්‍රදේශය
- සබරගමුව ස්වල්පයක
- අතිශය සවස්කාලය

• උෞච්ච, උෞච්ච-උෞච්ච, මධ්‍ය සහ උෞච්ච ප්‍රදේශයේදී ප්‍රදේශයේ වරින් වර 40 km/h තරමට වැඩි වැසි ඇතිවිය හැක.

• ගිගුරුම් සහිත වැසි සමග ඇතිවිය හැකි තාවකාලික තද සුළං වලින් සහ අකුණු මගින් සිදු වන අනතුරු අවම කර ගැනීමට අවශ්‍ය පියවර ගන්නා ලෙස ජනතාවගෙන් කාරුණිකව ඉල්ලා සිටිනු ලැබේ.

වර්තමාන ඉතර් නෙට් (20220501 0600 hrs)

ආපදා කළමනාකරන මධ්‍යස්ථානයේ ප්‍රධාන පිටුව

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Figure 5-16: The 18th post on the Disaster Info Sri Lanka Facebook page

5.2.3. Case Study II: Investigating the WhatsApp group of Disaster Info Sri Lanka

WhatsApp can be regarded as a prevalent social media platform in Sri Lanka, serving as an effective means of communication [317]. WhatsApp typically facilitates interpersonal communication within a community through the exchange of personal content. Nevertheless, numerous community organisations often utilise WhatsApp as a contemporary means of communication to disseminate diverse information to the broader community. Typically, diverse social groups and news media outlets utilise WhatsApp as a means of disseminating information to the broader public. This research included an examination of the utilisation of the WhatsApp messenger application for the purpose of distributing information related to disasters. To facilitate the execution of this particular phase of the research, two distinct WhatsApp groups were established. The group of individuals who follow updates on a regular basis were provided with daily updates regarding the current state of the global COVID-19 outbreak.

In addition, the groups received regular updates on government announcements and weather-related information on a daily basis. The establishment of the first WhatsApp group took place on March 16, 2020, which coincided with the initial escalation of the COVID-19 epidemic in Sri Lanka. On account of exceeding the prescribed limit for the number of participants in a WhatsApp group, a supplementary group was established on the very same day. As a result, two distinct groups were assigned the labels "Disaster Info SL 1" and "Disaster Info SL 2".

The distribution of text messages encompassed both Sinhala and English languages, containing updates on the COVID-19 outbreak at both national and international levels. An additional primary factor that was taken into account was the level of interactivity in the information being presented to the audience. Initially, a textual communication pertaining to routine COVID-19 updates was disseminated among the collective entities, accompanied by a concise visual representation in the form of several images, serving as a synopsis of the comprehensive textual content disseminated. Subsequently, updates regarding the COVID-19 pandemic were

disseminated, encompassing a concise textual exposition accompanied by an illustrative depiction that encapsulated the entirety of the information.

5.2.3.1. Analysing the Performance of the WhatsApp Groups

Over the course of time, it was observed that certain team members opted to depart from the group for a multitude of reasons. Consequently, a telephonic survey was conducted in late August 2020 with the purpose of gathering feedback from individuals who had disengaged from the group. The departing members were classified into two distinct categories based on the timing of their departure from the group. The decision regarding the timeframe was formulated with consideration for the prevailing COVID-19 pandemic situation in Sri Lanka, in order to ascertain the factors contributing to the departure of individuals within various phases of the pandemic. There are two distinct categories of group members: those who withdraw from the group during its initial stages, and those who withdraw from the group after a certain period of time. The telephone survey investigated the inclination of enthusiastic group members to seek additional information about disasters through social media and messenger applications. The data collected pertained to each category of group members who voluntarily departed from the WhatsApp groups.

- The potential of utilising WhatsApp as a means of interaction for disaster-related purposes during the COVID-19 outbreak in Sri Lanka.
- Potential factors that may contribute to individuals experiencing disappointment when utilising WhatsApp, perceiving it as a disastrous experience.
- Means of obtaining information, its reliability, and timeliness.
- Additional information they would prefer from a service that distributes warnings, cautions, and disaster-related information.
- Other disaster-related communication formats and strategies which can be adopted.

Members were polled regarding their preference for using WhatsApp to subscribe to a service, as well as a few other factors that could influence the utilising of WhatsApp as a disaster-related information-sharing medium, as shown below.

- Present forms of obtaining information
- Favoured means of getting information
- Most beneficial disaster-related information that should be communicated via WhatsApp

Five Tamil-speaking people took part in the telephone survey. They pointed out that in this group messages were being sent in English and not Tamil. Further explorations were carried out to determine the language problem in the Tamil-speaking community to obtain information about the COVID-19 pandemic. A supplementary questionnaire study was undertaken to learn about their preferred forms of getting information, their needs, and the impact of language on information dissemination.

A total of 106 people were found to have quit the two groups. Eighty-three of them were recognised as members who abandoned the group early on (less than one month), while the other 23 left after a long period of time (more than one month). 86.5 per cent of respondents were under the age of 25, indicating that this study is geared toward a younger audience. The telephone survey was not completed by 43 of the 83 members who departed the group initially. Nine of their mobile phones were turned off, while the remainder did not answer the phone. The group was remembered by 23 people, whereas 17 people had no recollection of being a part of it. A total of 12 replies were gathered from the group of participants who had been identified as having left the group after an extended period of time.

WhatsApp is the most popular messaging app among the survey participants. Respondents were asked to rank their WhatsApp usage on a scale of low to moderate, then heavy. Low usage refers to those who check WhatsApp only a few times per day, fewer than three times per day, and heavy usage refers to people who always check WhatsApp (more than three times per day). According to the data, 58 per cent of respondents were restrained users, and 30% were heavy users of WhatsApp. A

minority of individuals, comprising approximately 12 percent, exhibit infrequent utilisation of WhatsApp in their daily routines. The primary social media platforms utilised by the majority of the respondents are Facebook and WhatsApp. In addition to this, a limited number of individuals exhibited interest in YouTube, Twitter, and Instagram.

Only five people were identified as members of various WhatsApp groups that provide services like news, weather alerts among the 52 respondents. Three of them were members of news-disseminating WhatsApp groups. Aside from that, their participation in WhatsApp groups that provide services is minimal. Only two respondents said they do not want to subscribe to a facility that distributes early warnings and disaster-related information. Typical sources utilised include group conversations on the messaging platform WhatsApp with acquaintances, as well as the instant notification application "*Helakuru*." The individuals exhibit a lack of willingness to engage in service subscription via messaging platforms, primarily attributed to their demanding lifestyles and the prevalence of disseminating untrustworthy information across these communication channels.

The respondents placed significant emphasis on several common expectations, including the daily COVID-19 report, government notices pertaining to areas under curfew, and other relevant information, as well as warnings regarding newly infected COVID-19 patients. Figure 5-17 illustrates the prerequisites that prospective participants are required to meet in order to be admitted as members of the "Disaster Info SL" WhatsApp group.

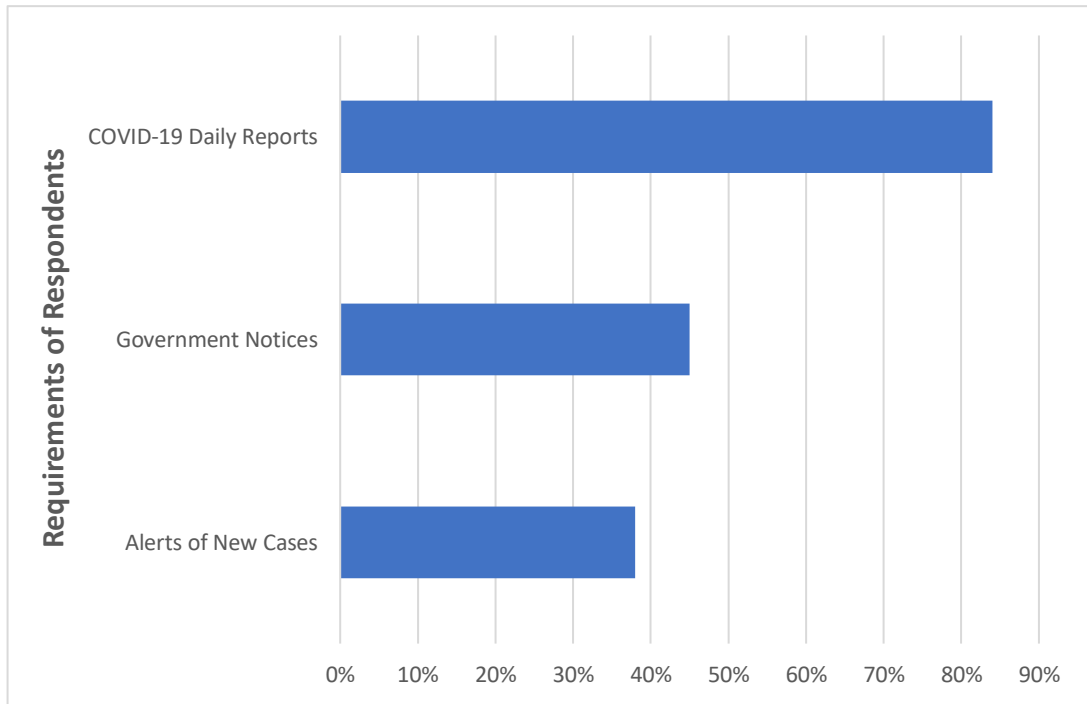


Figure 5-17: The prerequisites for individuals interested in becoming members of the "Disaster Info SL" WhatsApp group

At the outset, respondents were questioned about their reasons for leaving the group. There are typical factors, such as an overabundance of information at the moment, the importance of timeliness, and the length of text messages sent to the group. Other reasons given by respondents included not wishing to get such material through WhatsApp groups and turning on mobile data to obtain information that is not useful. One respondent had developed their own information-gathering smartphone application. Remaining a member of this particular group was perceived as burdensome as a result of the substantial quantity of members. Individuals who chose to disassociate themselves from the collective entity expressed the belief that obtaining COVID-19-related information was no longer necessary, given Sri Lanka's ongoing recovery from the aforementioned pandemic. Nevertheless, the prevailing rationale provided is that individuals departed from the organisation as a consequence of being overwhelmed by an excessive amount of information. The findings are depicted in Figure 5-18.

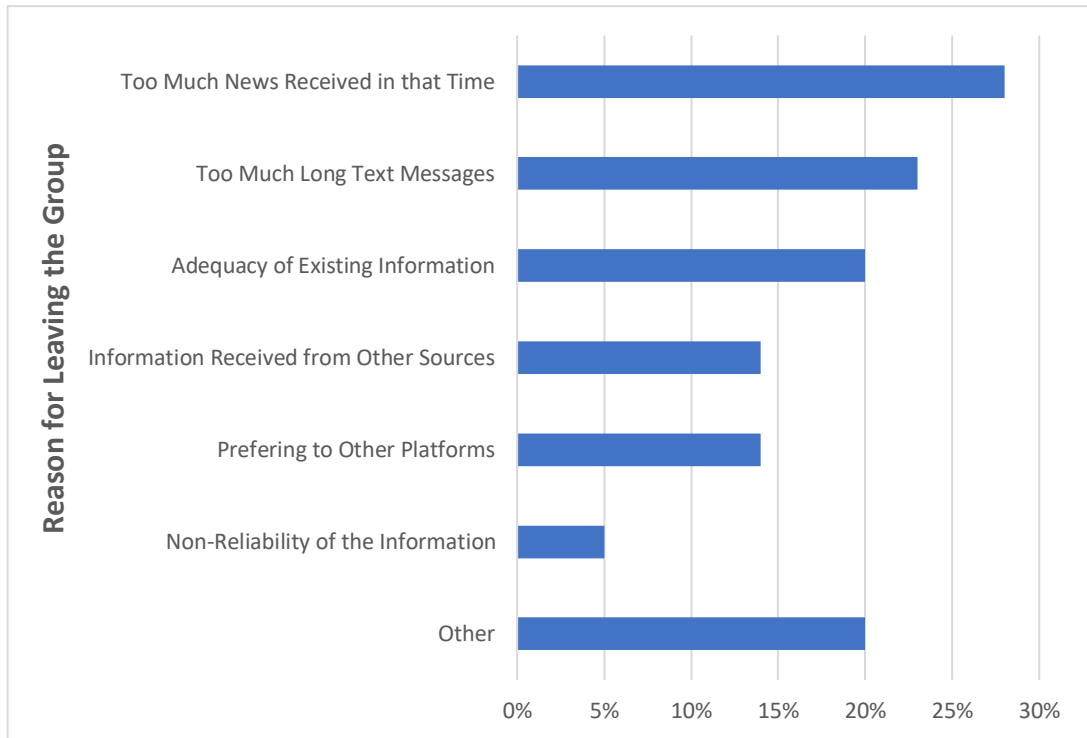


Figure 5-18: Reasons for leaving the WhatsApp group

Participants were queried about their requirements in the event that they expressed interest in subscribing to a service that disseminates information pertaining to disasters. Within the additional classification, the inclusion of sports and political news was noted. The participants were presented with various choices, and it was found that 50% of them considered weather notifications to be a crucial necessity. This was followed by security warnings, which were desired by 48% of the respondents. Additionally, 40% of the participants expressed a preference for receiving rush-hour traffic updates, while 38% indicated a desire for health-related news. Furthermore, participants were queried about their preferred method of receiving information if they were interested in subscribing to an early warning service, with consideration given to contemporary social media and messaging platforms. Based on the preferences expressed by the respondents regarding different media platforms, it was found that 52 percent of them exhibit a tendency to employ WhatsApp as a means of crisis communication. Additionally, Facebook and Twitter occupied the second and third positions, respectively, accounting for a collective proportion of 31%. According to the survey results, 27% of the participants indicated their preference for SMS alert

services, while 23% of the respondents mentioned other platforms such as websites and quick notification applications.

The examination of the source of the information unveiled a higher level of confidence in governmental authorities, with the exception of the Meteorology Department. There were multiple alternatives for selecting authority, and a notable 46 percent of participants opted for the Ministry of Defence. The Media and Disaster Management Centre in Sri Lanka was found to have received the second-highest level of preference, accounting for 29 percent. Seventeen percent of the participants indicated their preference for the Department of Meteorology of Sri Lanka, whereas only 12 percent expressed their inclination towards community organisations, such as university societies.

5.2.3.2. A Survey Questionnaire on Language Challenges within the Tamil Speaking Community

A total of 121 people answered the poll, with 93.4 per cent of them being between the ages of 20 and 25. According to the results, their English language proficiency is higher than their Sinhala language competency. Television, WhatsApp, and posts from Facebook pages are the top three ways they obtain information about COVID-19. However, their preferred sources of information are television, WhatsApp, and radio, in that order. It emphasises their continued reliance on traditional media over social media.

Additional investigation into the Facebook pages from which they source their information unveiled that a majority of them, specifically over 40 percent, rely on journalists as their primary information source. Notably, it was observed that the information obtained by these pages is predominantly in the English language. Based on the research findings, it was observed that a majority of the participants did not receive news releases, precautionary measures, or any other information pertaining to COVID-19 in the Tamil language. Furthermore, over 30 per cent of respondents stated that they did not receive the COVID-19 daily identified patients, curfew announcements and other statistics updates. They have also emphasised the

importance of obtaining information in Tamil. They claim that statistic reports and other governmental alerts be made available in Tamil and emphasise the need for information in Tamil via social media platforms.

5.3. Analysis of Government Represented Disaster Management Stakeholder

This section elucidates the conduct of the government's disaster management participants in the utilisation of social media during times of catastrophes in the Republic of Sri Lanka. Various stakeholders related to the government have been using several communication channels to share disaster-related information with other stakeholders. Print Media, Electronic Media, and In-Person events are common types of media used by Disaster Management Stakeholders in Sri Lanka [96], [97], [101]. The available resources and the target audience for the particular message determine which channel should be utilized to communicate the disaster-related information [106]. Also, there should be specific characteristics of the communication channels used by the Disaster Management Stakeholders to improve the effectiveness of the communication, such as reaching the entire target audience (higher capacity), getting information to the audience when they need it, expected to deliver the message reliably and timely, ability to quickly understand the content of the message, accessed within resource limitations and ease of use and the ability to communicate the real-time information [107]. The Crisis Response and Disaster Resilience 2030 initiative by the Federal Emergency Management Agency (FEMA) has recognised several emerging challenges in the field of disaster management. These challenges include the identification of novel and unfamiliar operational scenarios, a rise in the frequency of disasters, a larger volume of information to be analysed within potentially constrained timeframes, the integration and advancement of new technologies, and an increase in the number of stakeholders [108]. Scholars have identified that the traditional disaster risk management approaches are not insufficient to address the new challenges in disaster risk management [109]. Hence, there is a growing demand for innovative strategic approaches to effectively address the complexities associated with disaster risk management. The proliferation of information and communication technology has prompted individuals to adopt novel communication channels on a global scale in

order to tackle the obstacles faced by the communication sector in the realm of Disaster Risk Management [87]. Social media was identified as the modern solution that provides sufficient flexibility and adaptability to enhance communication in the disaster risk management domain [110].

5.3.1. Identifying Social Media Use by Government Disaster Management Stakeholders

This section employed a case study methodology to identify the government stakeholders involved in addressing the specific hazard in Sri Lanka. Given that, this investigation was conducted during the COVID-19 pandemic, the chosen case study was the epidemic hazard category outlined in the Sri Lanka Disaster Management Act, No. 13 of 2005. The National Emergency Operation Plan (NEOP) was formulated by the Disaster Management Centre in accordance with the regulations outlined in the Sri Lanka Disaster Management Act No.13 of 2005. The occurrence of the Indian Ocean Tsunami disaster in 2004 necessitated the establishment of a National Emergency Operation Plan (NEOP), as outlined in the Disaster Management Act, No.13 of 2005. The responsibility of developing the National Emergency Operations Plan (NEOP) was assigned to the Disaster Management Centre (DMC) in accordance with the legislation outlined in Act [197]. During an emergency situation that surpasses the individual capacity or customary obligations of any single stakeholder, the NEOP (National Emergency Operations Plan) facilitates the allocation of responsibilities among stakeholders in a more streamlined manner. The system facilitates the establishment of appropriate lines of stakeholder connections and effectively coordinates all relevant actions in the event of a disaster [197]. One of the key aspects outlined in the NEOP pertains to the delineation of roles and responsibilities among various stakeholders across different hazard categories. Hence, in light of the categorization of epidemic hazards, the stakeholders have been identified by the designated authorities based on the prescribed actions outlined in the National Epidemic Outbreak Plan (NEOP) for each stage of the epidemic [197]. In order to investigate the social media practises of the pertinent stakeholders, an examination was conducted on the accessibility of the social media applications overseen by said

stakeholders. Table 5-14 presents an overview of the stakeholders that have been identified, along with their current social media practises. The table also includes specific examples to illustrate these practises.

Table 5-14: The stakeholders responsible for the epidemic hazard category, as identified by the NEOP, and their corresponding social media practises

Label	Name of the Stakeholder	Availability of Social Media	Example
DMC	Disaster Management Centre	Yes	DMC Sri Lanka Facebook Page
MoH	Ministry of Health	Yes	Health Ministry Media Facebook Page, Health Promotion Bureau
MMMI	Ministry of Mass Media	Yes	Department of Government Information - Sri Lanka Facebook Page News.lk
AAS	Airport and Aviation Services	Yes	Airport & Aviation Services Sri Lanka Private Ltd Facebook Page CAASL - Civil Aviation Authority of Sri Lanka
MFA	Ministry of Foreign Affairs	Yes	Foreign Ministry - Sri Lanka
MLG	Ministry of Local Government	Yes	Ministry of Public Administration, Home Affairs, Provincial Councils & Local Gov. Facebook Page

GP	General Public	Yes	-
PM	Public Media	Yes	Media 1, Media 2, Media 3
UN	United Nation	Yes	United Nations Sri Lanka Facebook Page
NDMCC	National Disaster Management Coordination Committee	No	-
SLP	Sri Lanka Police	Yes	Police Communication Division, Sri Lanka Police Facebook Pages
SLM	Sri Lanka Military	Yes	Sri Lanka Army - Defenders of the Nation Facebook Page
NGO	Non-Government Organization	Yes	Sri Lanka Red Cross Society, Association of Disaster Risk Management Professionals
HP	Hospitals	Yes	Teaching Hospital – Rathnapura, Colombo North Teaching Hospital -Ragama
LA	Local Authorities	Yes	Horana Pradeshiya Sabha, Rathnapura District Secretariat

GN	Grama Niladhari	Yes	Grama Niladhari Unity-Passara, Grama Niladhari office, Vineethagama Grama Niladhari
HO	Public Health Inspectors, Doctors	Yes	The Public Health Inspector's Union of Sri Lanka - PHI, Government Medical Officers' Association
DDS	District/Divisional Secretaries	Yes	Divisional Secretariat Rathnapura, Gampaha Divisional Secretariat
RW	Relief Workers	Yes	Team IRONMAN 4x4 Sri Lanka
DDMCU	District Disaster Management Coordination Unit	Yes	District Disaster Management Centre - Kegalle
FA	Foreign Agencies	Yes	Worldometers - real-time world statistics, High Commissions, Embassy
AP	Airport	Yes	Bandaranaike International Airport - Facebook Page
NWS&DB	National Water Supply and Drainage Board	Yes	NWSDB Facebook Page

Connectivity between the stakeholder was recognized according to the actions assigned in NEOP for each stakeholder in the before, during and after stages of the epidemic hazard category. In order to visualize the communication grid, the connectivity of the stakeholders is required to be plotted to develop the model network of the stakeholders. Social Network Analysis (SNA) method was utilised to visualize the network behaviour graphically to comprehend it comprehensively. Gephi emerged as the predominant open-source software utilised for the purpose of conducting graphical and network analysis on intricate models. Data analysts are able to effectively uncover patterns and trends, identify outliers, and effectively communicate narratives using their data [316]. Gephi (Version 9.2) software was utilised to model the communication network behaviour of the identified stakeholders responsible for epidemics. In the developed model, the nodes represented stakeholders, and the edges represented the connectivity among each stakeholder. Two scenarios were considered for this study: the general connectivity of the stakeholders according to the NEOP and the connectivity of the stakeholders through social media. The connectivity of the stakeholders via social media was explored, considering the sharing of information related to the epidemics of each stakeholder.

5.3.2. Exploring the Connectivity of the Government Stakeholders

Figure 5-19 represents the communication network model for the general connectivity of the epidemic-related stakeholders according to the NEOP. The model that was constructed comprised of 26 nodes, where each node represents a stakeholder, and a total of 26 edges. The maximum geodesic distance, also known as the diameter, was found to be 5. This indicates that the maximum number of nodes required to connect any two vertices is 5. On average, there were 2.505 nodes connecting two vertices.

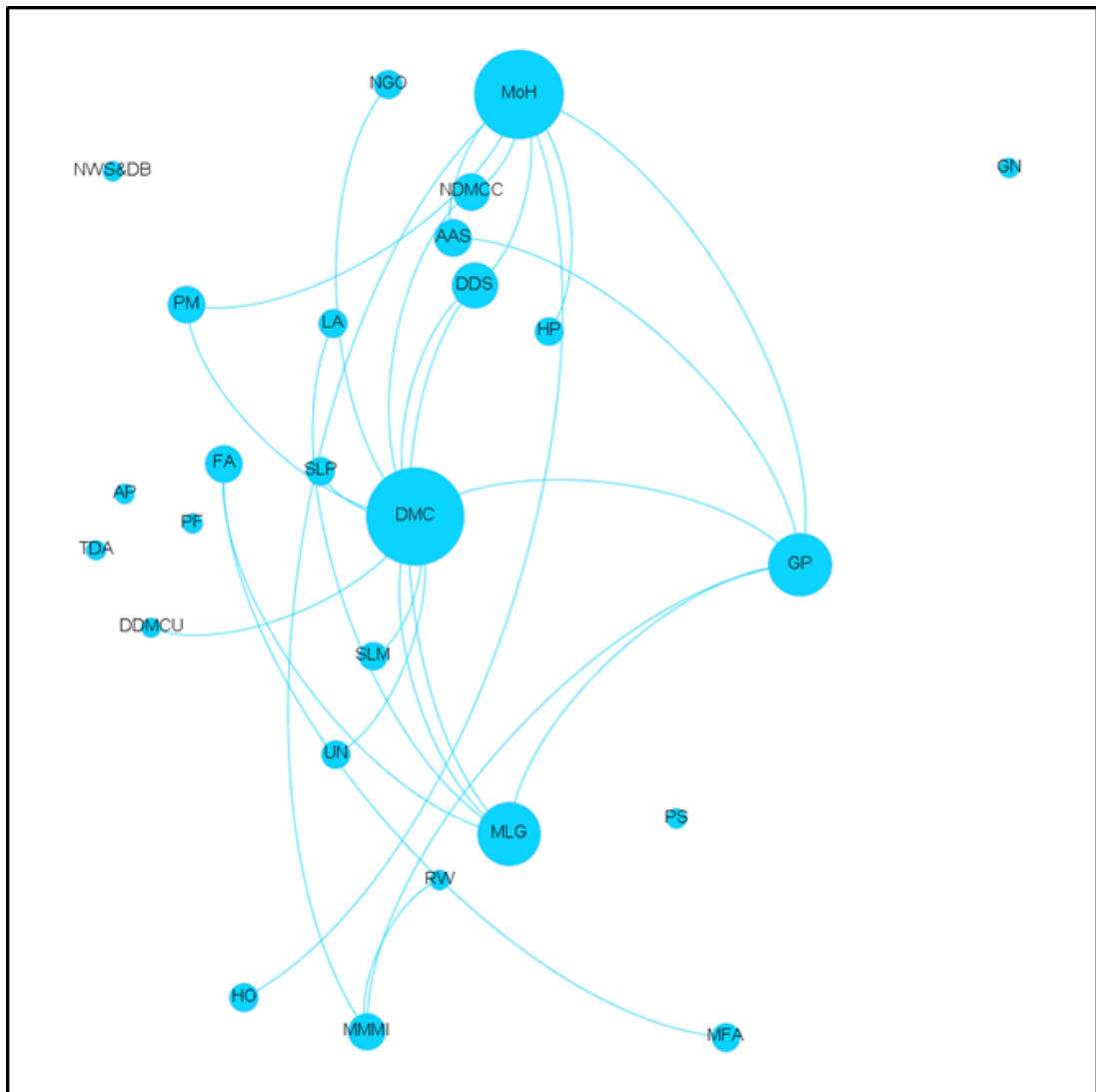


Figure 5-19: General communication network model of stakeholders in epidemic

Several centrality parameters were calculated using the Gephi software to describe the network by elaborating the network’s performance through the SNA approach. Calculated centrality parameters for the developed model presented in Figure 5-19 are given in Table 5-15.

Table 5-15: Computed centrality parameters for the general network communication simulation of stakeholders involved in an epidemic

Id	Label	Degree Centrality	Closeness Centrality	Betweenness Centrality	Eigenvector Centrality
1	DMC	10	0.72807	90.833333	1
2	MoH	8	0.635965	47.833333	0.84166
3	MMMI	3	0.504386	18	0.419593
4	AAS	2	0.469298	0	0.392593
5	MFA	1	0.312281	0	0.045829
6	MLG	5	0.605263	50.333333	0.660726
7	GP	5	0.622807	41.5	0.79784
8	PM	2	0.513158	4.5	0.442842
9	UN	1	0.429825	0	0.240747
10	NDMCC	2	0.513158	4.5	0.442842
11	SLP	1	0.429825	0	0.240747
12	SLM	1	0.429825	0	0.240747
13	NGO	1	0.429825	0	0.240747
14	HP	1	0.392105	0	0.202095
15	LA	1	0.390351	0	0.159458
16	GN	0	0	0	0
17	HO	1	0.392105	0	0.202095
18	DDS	3	0.561404	10.5	0.6023
19	RW	1	0.348246	0	0.101829
20	DDMCU	1	0.429825	0	0.240747
21	FA	2	0.425439	18	0.174612
22	AP	0	0	0	0
23	NWS&DB	0	0	0	0
24	PF	0	0	0	0
25	PS	0	0	0	0
26	TDA	0	0	0	0

Based on the data presented in Table 5-16, it is evident that the Disaster Management Centre (DMC) has achieved the highest centrality parameter values when compared to the other stakeholders. The diagram in Figure 5-20 illustrates the model of a communication network that facilitates the connectivity of stakeholders involved in the management of an epidemic through social media platforms. The model comprises 26 nodes, each representing a stakeholder, and a total of 63 edges. The maximum geodesic distance, also known as the diameter, is 3, indicating that the maximum number of nodes connecting any two vertices is 3. On average, there are 1.866 nodes connecting the vertices. The connectivity of each stakeholder with the other stakeholders via social media was explored by considering each stakeholder's activities through social media that caused them to connect with other stakeholders, such as sharing posts.

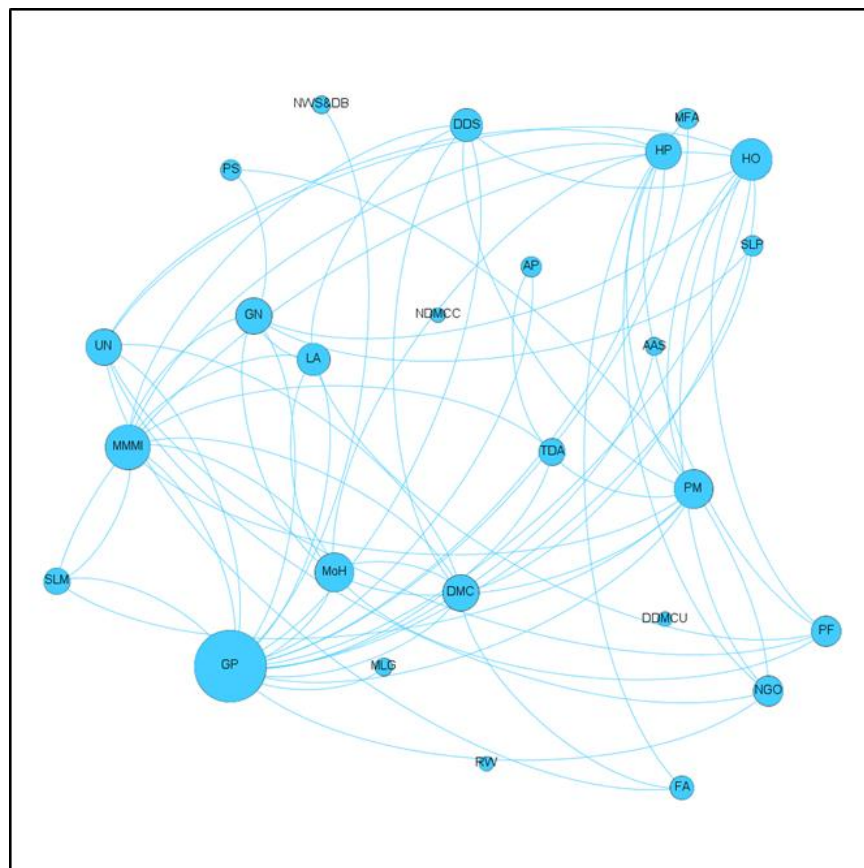


Figure 5-20: Stakeholder communication network model using social media for epidemic management

Calculated centrality parameters for the developed model presented in Figure 2 are given in Table 5-16.

Table 5-16: Computed centrality parameters for interaction network structure for those involved in an epidemic, from data obtained from social media sources

Id	Stakeholder	Degree Centrality	Closeness Centrality	Betweenness Centrality	Eigenvector Centrality
1	DMC	7	0.578947	9.681746	0.537274
2	MoH	8	0.611111	5.905267	0.62014
3	MMMI	10	0.647059	9.805267	0.72097
4	AAS	1	0.478261	0	0.131477
5	MFA	2	0.5	2.813492	0.15302
6	MLG	1	0.478261	0	0.131477
7	GP	19	0.88	125.1248	1
8	PM	8	0.578947	4.122727	0.617758
9	UN	7	0.594595	11.29686	0.469967
10	NDMCC	0	0	0	0
11	SLP	2	0.5	0	0.196046
12	SLM	4	0.52381	0.166667	0.385912
13	NGO	5	0.564103	9.12381	0.361469
14	HP	7	0.594595	5.235029	0.542416
15	LA	6	0.564103	3.548485	0.483984
16	GN	7	0.578947	14.06786	0.491785
17	HO	9	0.628571	12.44452	0.620785
18	DDS	6	0.564103	1.370635	0.519028
19	RW	0	0	0	0
20	DDMCU	0	0	0	0
21	FA	3	0.423077	1.166667	0.153636
22	AP	2	0.488889	0	0.174773
23	NWS&DB	1	0.478261	0	0.131477

24	PF	5	0.468085	1.792857	0.357348
25	PS	2	0.407407	0.333333	0.112636
26	TDA	4	0.511628	1	0.328619

Table 5-17 shows that General Public (GP) has received the maximum centrality parameter values compared with other stakeholders.

5.3.3. Investigating the Various Social Media Applications being Used

The study examined a variety of social media applications that were overseen by disaster management stakeholders. The study employed the Social Network Analysis method to examine the behaviour of social media applications under the management of disaster management stakeholders. Based on a recent study, it has been determined that governmental stakeholders are perceived as the most reliable source of information by the Sri Lankan community when it comes to receiving early warning information [26]. The present study focused on four prominent governmental stakeholders involved in disaster management in Sri Lanka, namely the Disaster Management Centre, Department of Meteorology, Department of Government Information, and Health Promotion Bureau. Upon conducting an examination of the social media platforms overseen by the various stakeholders, it has been determined that Facebook emerges as the most effective social media platform under their management. Hence, the aforementioned stakeholders were officially responsible for the management of four Facebook Pages that were included in this study.

Before applying SNA, relevant data should be extracted from the above Facebook pages. Due to the privacy policies of the Facebook platform, only publicly available data were collected for this study. Therefore, the data collection process was constrained by the inability to ascertain the manner in which the shared information from specific Facebook pages was disseminated among the profiles and pages of other online communities on the platform. The data were gathered using the Facepager Software, a web-based application designed for automated data retrieval [315]. Data was collected from the posts on Facebook pages operated by the aforementioned stakeholders published from 2020/12/31 to 2021/06/05. Though several kinds of data

were collected from the Facebook Pages, descriptions of the posts and the shared count of each post were considered for the present study. Gephi (Version 9.2) software was used to map out the behaviour of the Facebook pages where the node is denoted by the posts (original posts and the shared posts according to the share count), and the connection between posts represents an edge by considering the sharing of each post by the online users. Edges were assumed to be considered regardless of their direction. Figure 5-21 presents the behaviour of each Facebook page managed by the different government stakeholders responsible for DRM in Sri Lanka visualized through the Gephi software. Several centrality parameters were calculated for each visualization for a better approach through SNA, and Table 5-18 presents the calculated parameters with a general overview of the selected Facebook pages.

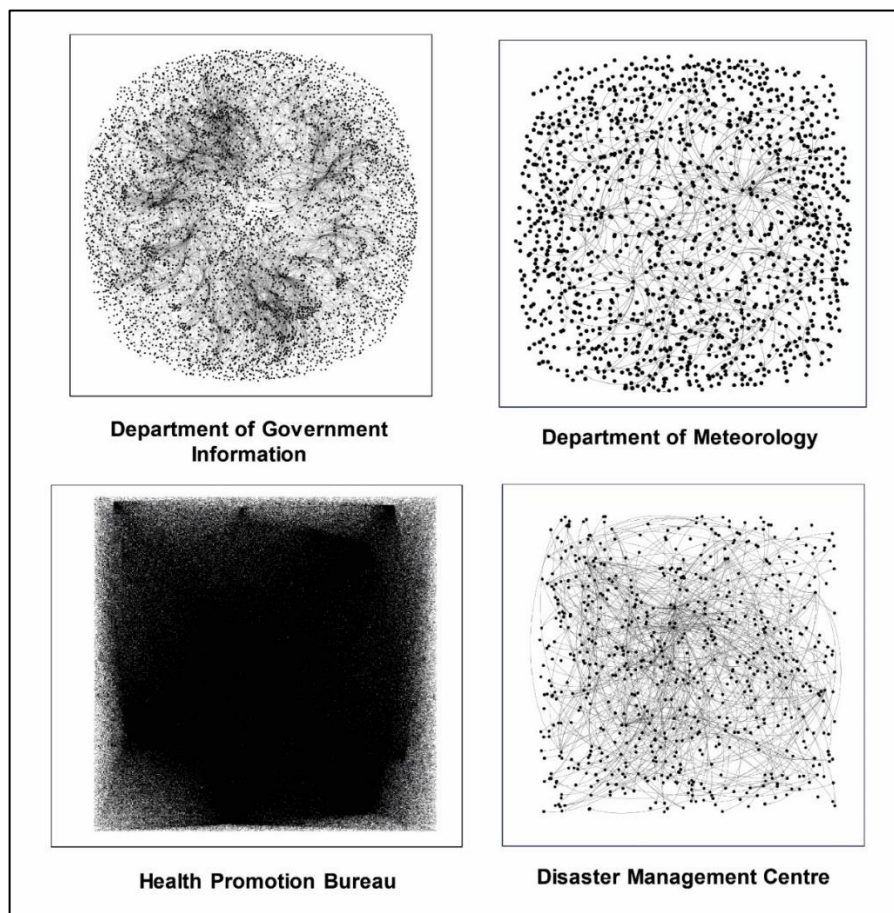


Figure 5-21: Visualisation of the behaviour exhibited by each Facebook page associated with government stakeholders

Table 5-17: Visualisation of the behaviour of each Facebook page utilising the Gephi software

Page Name	Verification on Social Media	Likes (8/11/2021)	Nodes	Edges	Maxim. Degree Centrality	Maxim. Betweenness Centrality	Maxim. Eig-vector Centrality	Diameter Avg. Path Length
Department of Meteorology - Sri Lanka	No	17,099	1313	362	21	210	1	2 1.7
Department of Government Information - Sri Lanka	Yes	145,357	20805	5072	161	44604.5	1	45 8.93
Health Promotion Bureau	Yes	499,904	30700	4080	33084	547258986	1	2 2.95
DMC Sri Lanka	No	17,327	1025	259	33	1309	1	6 2.57

5.4. Analysis of the Social Media Influencers

Individuals who use social media for emergency purposes can be divided into influencers and non-influencers. Influencers who practice their social media platforms to communicate about disasters can be separated from the non-influencers as they seem to have the maximum impact on disaster-related communication [261]. Previous scholars have identified that social media influencers have been engaging crucially with the general community, who are the non-influencers of the social media, by communicating with them through the comments of the disaster-related publications published via social media [318]. Therefore, to explore the behaviour of the disaster-related communication of the social media influencers with the non-influencers of the society, textual data were extracted from the comments, and the conversations developed through the posted information were analysed. The sentiment analysis technique was utilized to analyse the above textual data.

As previously mentioned in this study, sentimental analysis was used to explore the behaviour and interaction of the social influencers with the non-influenced social media users, particularly related to disaster-related information. Therefore, to conduct this study, two separate social media influencers were selected who used different social media platforms. Selected influencers are different professionals, and both of

them have been distributing disaster-related information through their social media platforms. Details of the selected social media influencers are presented in Table 5-19.

Table 5-18: Details of the selected social media influencer

	Profession	Social Media Platform	Analysed Data
Influencer 01	Medical Officer	Facebook	Comments on the Facebook Posts
Influencer 02	Journalist	Twitter	Hashtags, Mentions, Retweets and Quotes

The data necessary for analysis was extracted using QSR NVivo 12, a software specifically designed for qualitative research. NVivo is a software application that facilitates the analysis of unstructured data. NVivo is a software tool designed for qualitative and mixed-methods research purposes. The application of this tool encompasses the examination of unstructured data in various formats, including text, audio, video, and images. These data sources may include interviews, focus groups, surveys, social media content, and scholarly articles, among other forms of information. The NCapture add-on was installed on the internet browser in order to retrieve pertinent information from publicly accessible social media platforms.

Metadata extracted from social media platforms typically includes the Post-ID, Comment-ID, the identity of the individual or entity providing the comment, the textual content of the post or comment, the timestamp indicating the date and time of the post or comment, as well as the count of likes received. This investigation solely utilised the texts present in the comments field. In this field, certain extraneous characters were present and required removal. A string data type is utilised for the purpose of storing individual posts or remarks. In order to facilitate further processing, it is necessary to decompose this string into individual words.

English is a language that exhibits a considerable number of words with multiple meanings. For example, the etymology of the terms "analyse," "analyst," "analysis," and "analysing" can be traced back to the root word "analyse." Consequently, all aforementioned terms originate from their respective origins, thereby enhancing the

comprehensiveness of the search procedure. The NVivo software has the capability to conduct searches for synonyms of the terms that have been identified within the comments. As an illustration, when the subject of exploration is fear, terms such as terror, awe, and dread will manifest. Additionally, this system has the capability to process similar phrases such as "pick", "picks", "picked", and "picking". The auto coding tool in NVivo 11 is utilised for categorising comments into three distinct emotional categories: positive, negative, and neutral. The auto coder incorporates pre-existing lexicons for both positive and negative sentiment. Positive lexicon encompasses terms such as "happy," "smile," and "hope," among others, while negative lexicon encompasses terms such as "sad," "fear," "hate," "shame," "regret," "anger," and others. Neutral words refer to vocabulary that lacks a positive or negative connotation.

5.4.1. Experiments Conducted and the Corresponding Results Obtained from the Sentiment Analysis

5.4.1.1. Behaviour of the Influencer 01

The sentiment analysis of textual data from comments made by the non-influenced community on disaster-related posts published on a Facebook page managed by Influencer 01 was conducted using the sentiment tagging feature of NVivo 12. The sentiments were categorised into four distinct emotional states: moderately positive, very positive, moderately negative, and very negative. Each of these emotional states has its own lexicon within the NVivo software. In addition, the emotional classification can be modified by word modifiers such as "very," "more," or "somewhat." A significant proportion of the comments received on the disaster-related posts shared by Influencer 01 have been categorised as displaying a moderate level of positivity. The summarised results following the process of automatic coding are depicted in Figure 5-22.

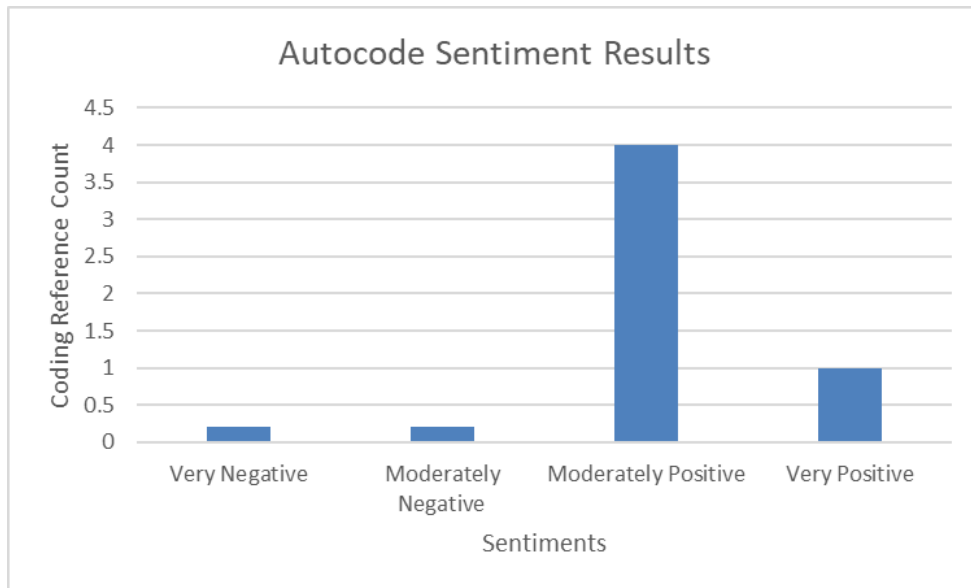


Figure 5-22: Autocode sentiment results of influencer 01

Comments that do not fall into any of the aforementioned categories are regarded as neutral. The auto code feature in NVivo endeavours to classify an entire comment as either positive or negative. The overall sentiment for the comments was categorized as positive, negative and neutral. The summary of the results has shown that the 60% of the comments are neutral, and the rest are positive.

5.4.1.2. Behaviour of the Influencer 02

As previously mentioned in this study, Influencer 02 uses Twitter to distribute disaster-related information to the non-influenced ordinary community. Textual data extracted from the Hashtags, Mentions, Retweets and Quotes related to the activities in Twitter of Influencer 02 were analysed using the sentimental analysis technique. Figure 5-23 shows the number of references in Tweets of Influencer 02. Furthermore, results show a considerable distribution of the Twitter activities of Influencer 02 around the world.

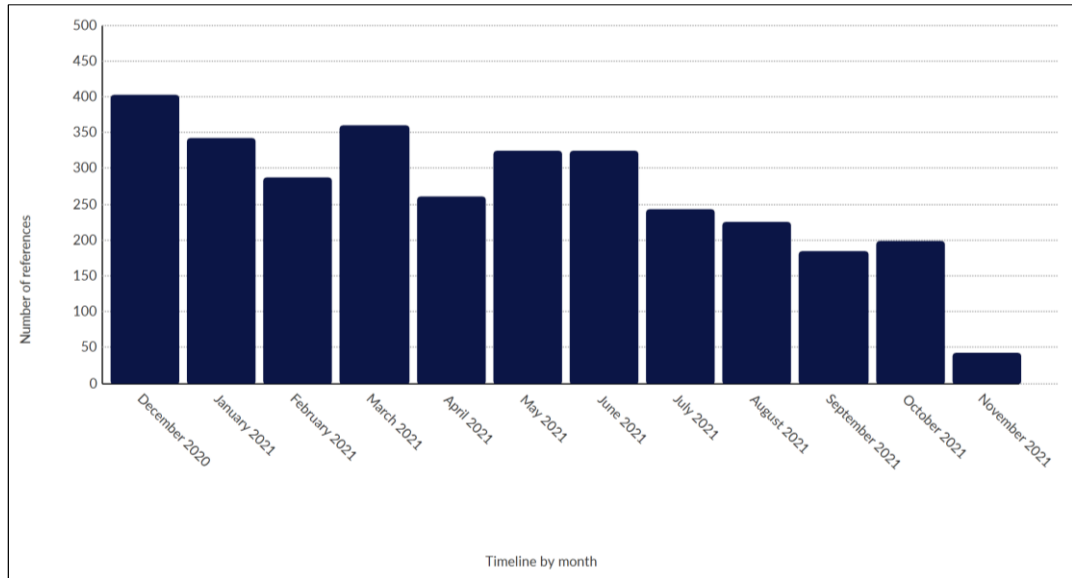


Figure 5-23: Number of references in Tweets of Influencer 02

In the case of Influencer 02, sentiments were assessed and categorised as moderately positive, very positive, moderately negative, and very negative emotions. Additionally, word modifiers such as "very," "more," or "somewhat" were taken into account during the coding process. Out of the considered Tweeter-related extracted data like Hashtags, Mentions, Retweets and Quotes, for the disaster-related posts published by Influencer 02, many comments have been coded as moderately negative. Figure 5-24 shows the summarised results after automatic coding.

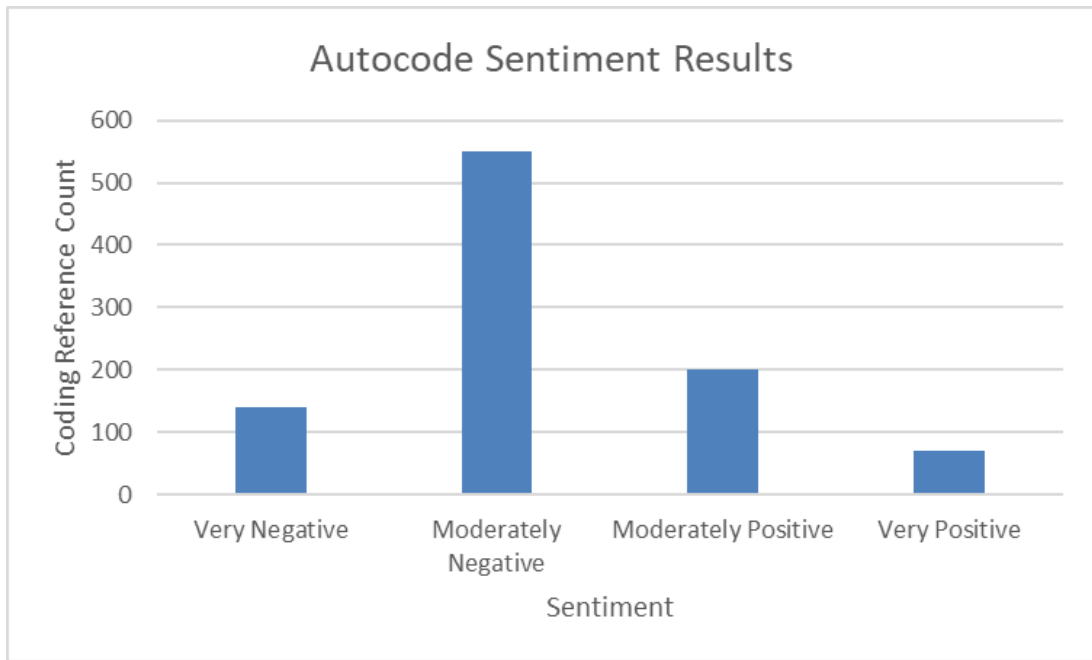


Figure 5-24: Autocode sentiment results of the influencer 02

Summarized results show that the analysed extracted Twitter data have been auto-coded as moderately positive and very negative in sentiment as second and third, respectively. Overall sentiment for the response of the Twitter activities related to the disseminating disaster-related information to the non-influenced general community by Influencer 02 was categorized. Results show that most of the responses (70%) for the Tweets of Influencer 02 have been auto-coded into the neutral category. 14% of responses are negative, and only 8% of responses have been recorded as positive.

The present analysis employed a word cloud, a visual representation technique designed to emphasise significant textual data elements. The Word Cloud tool visually represents the frequency of a particular word within a given textual dataset by displaying it in a larger and more prominent manner in the generated word cloud. The word cloud in Figure 5-25 was generated using NVivo 12 software, utilising textual data obtained from Influencer 02's Twitter account.



Figure 5-25: Word cloud generated to represent the Twitter engagement of the influencer 02

5.5. Discussion on the Utilisation of Social Media Platforms by Various Users

The findings of the conducted online survey indicate that individuals in Sri Lanka utilise social media platforms for a variety of objectives, including educational pursuits, business and marketing endeavours, electronic commerce activities, advertising initiatives, research endeavours, official communication, and social enterprise initiatives. Most people who consume their social media to receive disaster-related information have deliberately searched for those kinds of information on social media platforms like Facebook. Also, they have joined in public social media groups managed by various parties. People have used their social media for disaster-related information in many ways as to receive daily weather alerts, contact family members and friends during disasters, and provide and receive disaster relief.

Respondents have cited various reasons for preferring social media, such as their speediness, reaching a lot of targeted audiences in less time, easiness of access, receiving real-time information, and ability to use with portable devices during electrical failure too. It is a way to move as the heading to a digital future. The

participants who remain have brought attention to a range of limitations that are associated with the utilisation of social media within the context of disaster situations. The biggest flaw is that anyone can spread a rumour and unnecessary hype or tensions in society. Hence, concerns may arise regarding the reliability of the information obtained through social media platforms. Furthermore, various other downsides have been emphasized in the questionnaire. The respondents have raised some suggestions to improve social media practices throughout disasters in Sri Lanka. Regulating the spreading of misinformation and rumours is the central proposition made by the respondents. Various ways have been stated to fulfil that, such as sharing accurate information faster than rumours and misinformation.

This study examined the respondents' preferences regarding using social media platforms and messaging apps for disaster-related information. It has been identified that Facebook and WhatsApp have achieved the highest appreciation from the respondents to obtain disaster-related information. The Sri Lanka Digital Outlook 2020 report, published by the Asia Pacific Institute of Digital Marketing, reveals that Facebook holds the highest level of popularity as a social media platform, while WhatsApp stands out as the most renowned social media messaging application within the Sri Lankan community [217]. The incorporation of advanced functionalities within the Facebook and WhatsApp applications has resulted in a heightened level of interest among individuals in the DRC.

Based on the findings of a study conducted by reference [26], it was determined that the Disaster Management Centre, Sri Lanka Police, and the Media were identified as the most dependable entities in disseminating early warning alerts for disasters. The content of the warning, when endorsed by the government, serves to enhance and solidify trust. Moreover, under this study, the respondents selected Government information sources as the foremost information source on social media in delivering highly accurate information to the public. Facebook pages managed by the Health Promotion Bureau, Disaster Management Centre, Department of Meteorology and Department of Government Information have been actively engaging in the context of distributing disaster-related information to the general public. Around 70% of the

participants stated that they always cross-check the accuracy of the information they receive via any social media source. Accordingly, various methods have been used, such as verifying traditional methods and contacting responsible persons. In the context of the usefulness of information, News Media ranks it first in providing useful information to the general public. In Sri Lanka, several News Media have been disseminating information via social media to the general public. Therefore, there is fierce competition among the News Media in Sri Lanka. Due to that, News Media always tried to provide the most helpful information to the general public to get more attraction to their News Media. Within the questionnaire, respondents expressed various means by which disaster-related information disseminated through social media platforms can prove beneficial in their everyday lives. These include organising their daily routines based on the prevailing weather conditions, proactively preparing for potential severe hazards, staying informed about the well-being of their acquaintances, and facilitating the provision and receipt of assistance and relief efforts. Timeliness is receiving the information at a favourable or helpful time or availability when needed [319]. News Media have also been ranked as the best information source maintaining good timeliness practices through social media. Here, two primary criteria were concerned to get the rankings in the context of timeliness named up-to-date and the time difference between receiving and expecting information. With the development of technology, Sri Lankan News Media has been adopted the newest technological applications to provide real-time information to the ordinary public.

Several aspects have been recognised that need to be strengthened regarding social media performances in disaster-related information sharing in Sri Lanka. Greater emphasis should be placed on the Government authorities and News Media in Sri Lanka in order to improve the efficacy of disaster-related communication on social media platforms. This is due to their ability to deliver superior quality information pertaining to disasters through social media channels. The enhancement of disaster-related communication should primarily focus on utilising Facebook and WhatsApp, as these social media platforms are widely favoured among the Sri Lankan population for disseminating information pertaining to disasters. Ceasing the spreading of misinformation and rumours via social media is necessary for Sri Lanka to establish

better social media practices in disaster-related information sharing. Furthermore, adaptation for the Sri Lankan community's technological aspects needs to be improved, and necessary facilities like Internet facilities should be developed further. Awareness programs and simulation exercises need to be implemented for the general public to enhance their knowledge of the practice of social media throughout disasters.

According to the descriptive statistics of the questionnaire responses, 80.6 per cent of the questionnaire participants utilised social media to obtain information throughout disasters. As a result, it may be determined that a significant proportion of respondents currently use social media throughout disasters. Based on the demographic data provided by the participants, it is apparent that the sample encompasses a diverse range of age groups, occupations, and geographical regions within Sri Lanka, with the exception of Mannar and Mullaitivu. Consequently, the present research can be utilised to identify and analyse the determinants that impact the utilisation of social media platforms by the general populace for obtaining information pertaining to disasters in Sri Lanka.

The study employed Binary Logistic Regression (BLR) analysis to examine the associations between predictor variables and social media usage during disasters in Sri Lanka. Predictive variables encompassed age (V2), gender (V3), and past experiences with disasters (V4). The respondent's social media practice throughout disasters (V1) was used as the study's dependent variable. Several determinations were made based on the BLR analysis results to determine the fluctuation of the prognosticator factors linked with social media practice during catastrophes. Gender was discovered to be a non-significant predictor, indicating no link between social media use and gender.

Furthermore, according to this study, the growth in social media usage throughout the disasters in Sri Lanka caused the respondent's previous disaster experiences. When the age groupings variables are considered, it can be determined that the community aged 18-24 is more likely than the other age groups to utilise social media during disasters. During calamities, people between the ages of 25 and 34 also use social media extensively. The regression coefficient reveals that social media utilisation decreases as one gets older, from 18-24 to 45-54.

Nonetheless, people in the 55-64 and 65+ age categories in Sri Lanka have publicised improved social media practices amid disasters. In Sri Lanka, most persons in these age categories have retired from their employment and are content to stay at home. As a result, they may devote a significant amount of time researching and demonstrating the benefits of using social media during disasters. This could explain why people in these adult age groups used social media more frequently after the Sri Lankan disasters.

As depicted in Figure 5-13, a comparable fluctuation can be discerned in both graphs over time. One notable observation in both graphs is the increased variability exhibited by the charts over three distinct time periods. After conducting an analysis of the aforementioned time intervals, it is evident that these periods exerted a substantial impact on Sri Lanka as a result of the initial, subsequent, and subsequent waves of the COVID-19 pandemic. The temporal periods being examined are projected to encompass the months of March 2020 to July 2020, October 2020 to January 2021, and April 2021 to September 2021. These timeframes align with the occurrence of the first, second, and third waves of the phenomenon under investigation. Moreover, it is worth noting that both graphs exhibited their highest point during the initial wave of the COVID-19 pandemic. The observed discrepancy may be attributed to the Sri Lankan population's inclination to actively seek additional information regarding the initial wave of the novel coronavirus outbreak, given its novelty and impact on the Sri Lankan community.

Degree centrality is a metric used to quantify the number of connections or relationships associated with a node [320]. Moreover, it delineates the capacity of a node, commonly referred to as an actor, to engage in direct communication with other actors within the network. The notion of Betweenness Centrality pertains to the frequency with which a particular node is situated along the shortest path that connects various nodes within a provided network [321]. The term "network controllers" refers to individuals or entities that operate within a network and have a vital role in facilitating a greater number of connections. Based on the findings, it has been ascertained that post number 289 demonstrates the most elevated degree and

betweenness centrality values. Post number 289 garnered significant societal attention, particularly in the early stages of the third wave of the COVID-19 pandemic in Sri Lanka. The presentation of post number 289 demonstrates its concise and aesthetically pleasing qualities. The content comprises concise written information accompanied by a visual depiction. The aforementioned Facebook post has observed a notable surge in community engagement within the Disaster Info Sri Lanka Facebook page. Furthermore, it is crucial to recognise that Facebook posts exhibiting high betweenness centrality are of utmost importance in shaping the communication network's structure, as they serve as the gatekeepers within this framework. Furthermore, their involvement in the management of information dissemination on the Disaster Info Sri Lanka Facebook Page, in conjunction with external virtual communities, is of utmost importance.

Eigenvector centrality is a quantitative measure that evaluates the significance of a node within a network by taking into account the influence of its neighbouring nodes. The purpose of this tool is to quantitatively evaluate the level of influence that a specific node holds within a provided network [322]. Post number 18 has achieved the highest value of eigenvector centrality, which is linked to the MWU category. This particular category refers to the daily uploads carried out by the Department of Meteorology, Sri Lanka, in relation to the distribution of current weather reports. Despite the consistent distribution of posts within the MWU category, the level of engagement demonstrated by the page community has not exceeded that observed in other categories. The reduced degree of user engagement can be attributed to the decreased centrality measure associated with posts classified under the MWU category. Based on the analysis of eigenvector centrality, it can be inferred that post number 18, classified as MWU, demonstrates the highest level of influence within the network's framework. Eigenvector centrality offers a more advanced comprehension of centrality. The disparity in the value of connections grants certain nodes a comparative advantage over others [323]. Hence, it is crucial to prioritise posts that pertain to these specific categories in order to maintain the long-term unity of the Facebook page community.

Almost every respondent identified WhatsApp as the most commonly utilised tool. An examination of the reasons given by those who first left the Disaster Info SL WhatsApp group reveals that the overabundance of information was one of the significant factors. One additional noteworthy factor contributing to the decision to discontinue participation in the WhatsApp group was the receipt of an extensive textual communication within the group. Individuals who chose to disengage from the WhatsApp group subsequently did so based on their perception that the risk of a COVID-19 outbreak in Sri Lanka had subsided at that particular juncture. Based on prior scholarly investigations and the empirical evidence presented in this study, it can be inferred that social media platforms predominantly attract individuals belonging to the younger demographic, specifically those aged between 18 and 24 years.

Weather and security alerts are more important to people who subscribe to a service that disseminates disaster-related information through social media and chat platforms. Even though their preferred method of subscribing to this service differed, there was a clear preference for WhatsApp. According to the findings of this study, respondents said that the Ministry of Defence is the preferred authority from which they would obtain information. Government notices would be issued in Tamil, according to the Tamil community. They continue to rely on traditional media (i.e., television and radio), with social media platforms ranking third in obtaining information. Despite the widespread availability of social media platforms, a significant portion of individuals continue to exhibit a preference for conventional media channels, namely television and radio.

Additionally, upon the disclosure of the information, the mobile application known as "*Helakuru*," designed to facilitate the usage of Sinhala fonts on mobile devices, promptly notified its users regarding newly identified instances of COVID-19 at that particular juncture, as well as government declarations. The users of this mobile app had received the notices. Their short text was delivered as a notice, and it was well-received by those who had joined our WhatsApp group.

The connectivity of the stakeholders relevant to the epidemic hazard category in Sri Lanka as NEOP was explored. Two cases were considered as general connectivity of

the stakeholders according to the NEOP and their connectivity through social media. In the general context Disaster Management Centre (DMC) acts as the critical centralized stakeholder in epidemics in Sri Lanka since it acts as the coordinating stakeholder. The epidemic is a hazard that should lead the process by the health sector. Hence, the Disaster Management Centre (DMC) assumes the role of a central stakeholder, facilitating the connection between various health sector institutions in Sri Lanka, including the Health Ministry, Epidemiology Unit, Department of Health Services, and Medical Research Institute, with other relevant sectors responsible for managing epidemics. Therefore, in accordance with the National Disaster Management Plan (2013-2017), the coordination facilitated by the Disaster Management Centre (DMC) serves to alleviate the effects of epidemics and their subsequent consequences [63]. Ministry of Health has obtained the second-highest degree, closeness and eigenvector centrality values which illustrate the high responsibilities of the health sector. Ministry of Local Government (MLG) has got the second highest betweenness centrality as MLG plays a critical role in connecting stakeholders, especially at the community level. Even though the General Public (GP) is a critical stakeholder in this network, it has received relatively low centrality values. Limited stakeholders who are directly connected with GP according to the NEOP can be cited as the reason for this situation.

Furthermore, considerable complexity can be seen in the communication model via social media compared with the general communication network structure. Also, this comparison shows that Mass Media Institutions play a significant role in disaster-related communication on social media. Moreover, it is highlighted that the engagement of agencies related to relief services is high via social media as they have developed a proper community. According to the connectivity introduced through the NEOP, it can be seen that the involvement of the crucial stakeholders like DMC and MoH has become weaker in the epidemic category. However, stakeholders like Tourist Development, Public Social Media, and Public Figures have increased their engagement considerably through social media. The officers' engagement in health has also developed, considering their social media practice.

Nevertheless, more attention should be paid to the people migrating in and out of the country. Because there is less connectivity of that community with the other stakeholders via social media. Furthermore, this study was highlighted that international organizations like United Nations should improve the social media practices of the Sri Lankan disaster management stakeholders.

The complexity of the network model that appeared in Figure 5-19 has increased compared to the network model shown in Figure 5-20. This emerges that the engagement of the stakeholders responsible for epidemics in Sri Lanka has expanded when using social media for their connectivity. Centrality values, as shown in Table 5-17, also demonstrate that the network's structure has been enlarged with the utilisation of social media among the connectivity as the values such as degree centrality and betweenness centrality have been increased significantly compared with the centrality values shown in Table 5-16. Statistical overview highlights that the General Public (GP) is the centralized stakeholder in the network model developed for the connectivity of stakeholders through social media. It is essential to prioritize the GP as it is the critical stakeholder in this network model. It realizes that the General Public has more opportunities to connect with many disaster management stakeholders in Sri Lanka through social media compared with traditional connectivity. Due to the high connectivity with other relevant stakeholders, General Public can gain more disaster-related information efficiently and effectively. This initiative affords the general populace the chance to adequately prepare for and effectively respond to potential hazards in a timely manner, with the aim of mitigating the resulting damages and losses.

The examination of centrality parameter values indicates that stakeholders affiliated with the media industry have demonstrated a greater degree of engagement within the communication network formed through social media platforms. This statement asserts that media institutions have a crucial function in facilitating communication related to disasters via social media platforms. Considering the government sector, the Ministry of Mass Media Information (MMMI) has maintained a proper social media practice via Facebook. Department of Government Information – Sri Lanka is the

foremost institution that acts under the MMMI, which manages the public Facebook page appropriately and has more than 160,000 followers. It usually shares information regarding government decisions, press releases, gazette issues and other government activities. This Facebook page has also published awareness details about disasters, encompassing weather forecasts, relief services, and other disaster preparedness and response activities such as mitigation strategies, evacuation centres, evacuation routes, and emergency contact details. The government handles public media institutions, and private sectors are also managing Facebook pages by the name of their media institutions in Sri Lanka.

Textual analysis shows that moderately positive and moderately negative words are more common in the social media activities of both influencers. Overall, most of the Facebook comments and Twitter engagements are neutral, which illustrates the neutral conversations of the influencers with the non-influenced community. Hence, it is imperative for influencers to exhibit a more constructive demeanour when engaging with non-influential individuals within the community affected by the Sri Lanka disaster.

Based on the analysis of the word cloud, it is evident that terms associated with the COVID-19 pandemic have been prominently utilised, including COVID, health, deaths, and reported. Based on the circumstances surrounding the COVID-19 pandemic in Sri Lanka, it can be deduced that individuals who have not been directly affected by the virus have shown a heightened engagement with social media influencers, particularly in response to the challenging conditions prevailing in the country. The term "http:" emerged as the most frequently occurring expression in the word cloud analysis. This reflection affirms that social media influencers have successfully forged connections with the non-influenced general community in Sri Lanka by utilising social media platforms for the purpose of communicating about disasters.

The behaviour of the influencers emerged that there is high connectivity between the local communities. Through the NVivo, a sociogram can be developed, which is the graphical representation of the social links that influencers with the other influenced

communities and the popular social media accounts. The sociogram for influencer 02, generated through the utilisation of software, is depicted in Figure 5-29.

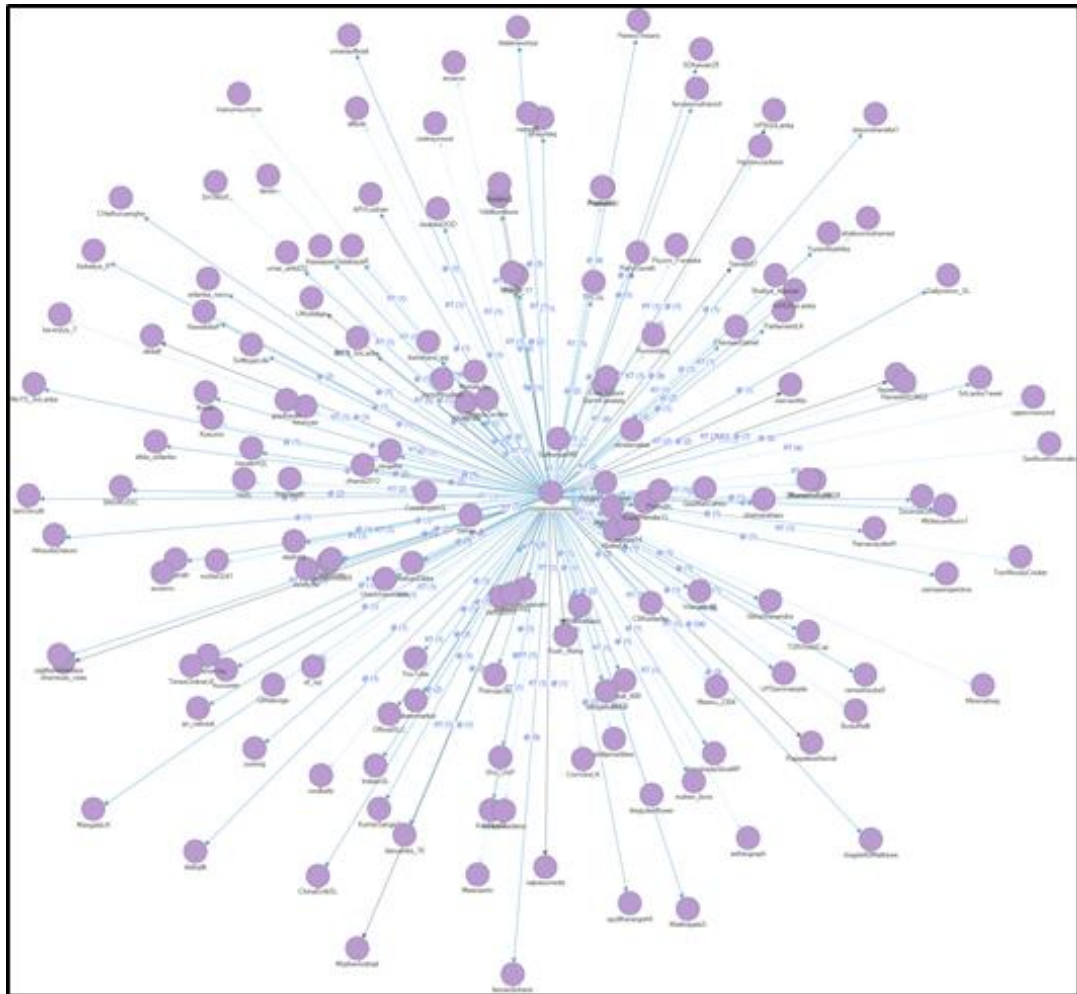


Figure 5-26: Constructed sociogram for the social media influencer 02 utilising software-based tool

Even though there is high connectivity of the influencers with the local social media community through the distribution map, it can be observed that there is less connectivity with the worldwide community. Therefore, the influencers should pay more attention to connecting with the overseas community through their social media practice. Several limitations were observed in the present study. The dataset was restricted to only text data; that is, emoticons, images, audio files, and videos were not considered for this study. Furthermore, Facebook users considered for this study do not accurately represent the general social media community.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Hazards have recently become an extremely concerning global phenomenon, as they have the potential to cause into disasters and put human lives in jeopardy. Various hazards, such as floods, landslides, and cyclones, commonly occur in Sri Lanka. They often lead to significant disasters that severely impact human life and properties. Sri Lanka has experienced significant hazards that have led to calamitous events and exerted a profound impact on both human lives and assets. The prevailing natural hazards in Sri Lanka encompass inundations, hurricanes, intense winds, landslides, and droughts. Some reported hazards in Sri Lanka had been induced totally or mainly by human activities and choices. The Disaster Management Centre, being the primary stakeholder, has undertaken various substantial initiatives in conjunction with affiliated entities to mitigate the adverse consequences of disasters in Sri Lanka. Sri Lanka has successfully established an all-encompassing early warning system that effectively addresses various hazards, operating at different administrative levels including national, district, and village levels. The Sri Lankan authorities responsible for disaster risk management have implemented a range of conventional strategies to effectively communicate information related to disasters within the local community. The increase in the occurrence and intensity of hazards in recent times can be attributed to a combination of factors including climate change, population growth, rapid urbanisation, and other contributing factors. As a result, authorities are able to disseminate information to large communities more efficiently, thereby reducing the time required for communication. As a result, governmental entities adopted innovative strategies to efficiently communicate disaster-related information to the local population. The widespread adoption of information and communication technologies, along with the extensive use of digital devices such as smartphones, tablets, and computers, has resulted in the significant growth of social media as a prominent platform for information dissemination among the general population. In recent times, there has been a widespread utilisation of social media platforms for the purpose of disaster communication on a global scale.

Previous survey studies conducted by scholars have identified a significant potential for enhancing social media consumption during disasters in Sri Lanka. Nevertheless, a comprehensive investigation into the current state of social media usage for communicating information about catastrophes in Sri Lanka has yet to be conducted. The literature review substantiated the notion that conducting such a study would contribute to the improvement of social media practises in the context of disaster situations. The primary objective of this study was to develop a conceptual framework for the utilisation of social media during disasters in Sri Lanka. This was achieved by conducting a comprehensive review of pertinent literature. The framework emphasised two primary categories, namely the users and the uses of social media during times of disasters. The present study employed various analytical methods to analyse the primary constituents of individuals who utilised social media platforms during times of calamities. Based on the aforementioned analysis, several conclusions have been drawn that offer potential for improving the effectiveness of disaster-related engagement on social media platforms in Sri Lanka.

Social media has the capacity to be employed in various ways across all phases of the disaster risk management cycle. In Sri Lanka, various governmental organisations such as the Disaster Management Centre, Health Promotion Bureau, Department of Government Information, Department of Meteorology, along with news media outlets, journalists, and diverse community groups, utilise social media platforms to effectively distribute information related to disasters to the general public. The current study utilised an established framework to create and conduct an online survey aimed at evaluating the current usage of social media platforms by the general population in Sri Lanka during periods of disaster. The conclusions of the study were derived through the analysis of the responses obtained from the questionnaire. A considerable proportion of social media users in Sri Lanka have embraced credible social media practises in order to access general information, particularly in relation to calamities. Within the Sri Lankan community, Facebook and WhatsApp have emerged as the predominant social media platforms utilised for the acquisition of information regarding disasters.

Approximately 60% of participants in the survey expressed the view that social media serves as a more effective platform for obtaining information pertaining to disasters compared to traditional media. The remaining 40% of respondents expressed that social media possesses various disadvantages in terms of obtaining information related to disasters. This study has identified a range of information sources that disseminate information related to disasters. The news media has been recognised as the primary and influential channel for disseminating reliable disaster-related information to the general public, with a focus on accuracy, usefulness, and timeliness. Hence, Sri Lanka exhibits considerable potential for enhancing the efficacy of disseminating disaster-related information through social media platforms. The improvement of social media practises by the disaster management authorities in Sri Lanka should be prioritised, while concurrently fostering public trust in the provision of disaster-related information by these authorities. It is imperative to implement suitable policies aimed at mitigating the dissemination of misinformation and rumours through social media platforms. There is a need for improvement in technological adaptation, as well as an imperative to enhance public awareness regarding social media applications. In addition, it is imperative to introduce awareness campaigns and simulation exercises targeting the general public in order to augment their understanding of appropriate social media usage in times of calamities.

In accordance with the findings, the Sri Lankans in the 18-24, 25-34, 55-64, and 65+ age clusters could be regarded as target community categories that should receive greater attention in order to improve and advance the practice of sharing information, which is relevant to the Sri Lankan disaster context, on social media. The aforementioned findings will provide valuable insights for an upcoming study that aims to enhance and advance the utilisation of social media throughout the country of Sri Lanka.

The ongoing investigation has yielded several noteworthy findings that have the potential to enhance the efficacy of strategies employed in managing a dedicated Facebook page aimed at disseminating information pertaining to disasters. During the height of the initial waves of the COVID-19 pandemic in Sri Lanka, a significant

increase in community involvement was observed on the Disaster Info Sri Lanka Facebook page. Moreover, it is apparent that there has been a noticeable decline in community involvement subsequent to the commencement of the COVID-19 pandemic. Hence, it can be inferred that the implementation of appropriate measures is imperative to ensure sustained community involvement on digital platforms, exemplified by the Disaster Info Sri Lanka Facebook page.

The case study under consideration has produced several crucial findings that are essential for obtaining a comprehensive comprehension of the social media performance in Sri Lanka with respect to the dissemination of information related to disasters. The act of sharing information regarding a contemporary societal event elicits greater levels of user participation in comparison to other forms of online content. These specific classifications of Facebook posts are intended to facilitate successful engagement with a wide range of external users on social media platforms. Therefore, it is crucial to give precedence to the dissemination of such articles rather than evading them. Furthermore, it is imperative to ensure that the content is both succinct and aesthetically pleasing in order to foster increased user engagement with the posts on a Facebook page. The posts concerning daily weather updates have not demonstrated a greater degree of user engagement in comparison to other categories of posts. The general populace demonstrated limited involvement with social media platforms as a means of obtaining regular updates, such as current weather conditions. Therefore, it is crucial to underscore the significance of promoting the utilisation of social media platforms by online communities for the purpose of accessing daily weather updates, considering their indispensable function in everyday life. Furthermore, these posts possess significant influence within the network, as they serve a vital function in maintaining the cohesion of the Facebook page.

Social media influencers play a pivotal role in utilising social media platforms for the purpose of disaster-related communication, as they possess direct connections with the general public through these channels. The current investigation highlights the necessity of enhancing connectivity between social media influencers and non-

influenced social media users in Sri Lanka with regards to the dissemination of disaster-related information.

The present study has exclusively concentrated on the distinct user categories of social media users who utilised social media platforms for communication pertaining to disasters in Sri Lanka. The study examines individuals' conduct in utilising social media platforms during times of crises, as well as the various platforms utilised, and the extent of connectivity facilitated by social media during such events. Future research can be conducted to investigate various social media practises employed in Sri Lanka for disaster-related purposes. The comprehensive development of the conceptual framework necessitates a more comprehensive understanding of social media utilisation during times of crisis in Sri Lanka. Based on the findings of the current study being examined, it can be deduced that Sri Lanka possesses considerable potential for improving the utilisation of social media as a means of enhancing disaster response strategies.

6.1. Recommendations

The present study has established a comprehensive framework wherein the utilisation of social media is categorised into two primary components, namely users and uses. The present study was conducted with a focus on individuals who utilise social media platforms during disaster situations. In order to facilitate future implementation, it is recommended that a thorough investigation be undertaken to examine the existing applications of social media in disaster scenarios, with the aim of identifying any existing deficiencies and obstacles. The utilisation of social media in disaster situations encompasses a broad spectrum of activities, ranging from mitigating the impact of disasters to facilitating the reconstruction phase of the Disaster Risk Management Cycle. To investigate the application of social media in disaster scenarios, researchers can employ a variety of quantitative and qualitative research methodologies. The framework proposed in this study allows for the utilisation of various data collection techniques, including the distribution of questionnaires, conducting interviews, and utilising census data. By conducting an analysis, it is possible to determine the current state of social media usage during disasters in Sri Lanka. This study aims to identify

effective strategies for enhancing the current applications and introducing novel applications of social media in future disaster situations in Sri Lanka.

Furthermore, within the framework of a calamitous event in a country like Sri Lanka, there are multiple social, economic, environmental, and political elements that contribute to a wide range of consequences affecting various sectors of the society. The factors mentioned above also exert influence on the selection of communication channels in a disaster scenario. The mode of information seeking pertaining to disasters can be influenced by an individual's monthly income, serving as an illustrative example. Moreover, this research considers the influence of these variables on metrics such as precision, promptness, and utility, which ultimately ascertain the calibre of disaster-related information transmitted through social media platforms. Considering the exclusion of these variables in the current study, it is recommended to undertake a thorough examination that incorporates the diverse factors that could potentially impact the augmentation of social media usage in forthcoming disaster situations in Sri Lanka.

Besides, the utilisation of social media in a singular catastrophic occurrence has been taken into account throughout the current investigation. Nevertheless, it is imperative to examine the multi-hazard situation in light of the prevailing trend of disasters in contemporary society. This is due to the emergence of reports indicating the occurrence of multiple disasters simultaneously [324]. The complexity of disaster-related procedures, including communication, is heightened by the extensive network capacity that emerges during hybrid events. The aforementioned intricacy could potentially exert an additional impact on the utilisation of social media during times of calamity. Nevertheless, prior research has recognised the considerable potential for rapidly disseminating information related to disasters to a network with significant capacity by employing innovative methods of utilising social media. Hence, as a prospective course of action, this study can be expanded to explore strategies for mitigating the inherent intricacies in disaster-related communication through the utilisation of social media in the context of a hybrid event.

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ANNEX 1: ONLINE QUESTIONNAIRE

 	Investigating the current situation of disaster-related communication in Sri Lanka
1. Introduction to the survey	
<p>The main purpose of this questionnaire survey is to gather information about the current context of disaster-related communication in Sri Lanka. As Sri Lankans, now we have to face various types of disaster situations such as floods, landslides, tsunamis and also pandemics like Covid-19. During the recent past, Social media plays a significant role in worldwide as an effective communication system in disaster situations. Through this questionnaire survey, it is expected to check the adaptation of social media in disaster-related communication in Sri Lanka.</p> <p>This is done as a part of a research study conducted collaboratively with University of Moratuwa and Global Disaster Resilience Centre of University of Huddersfield</p> <p>No personal identifying information will be collected in this study, and all participants shall remain anonymous.</p> <p>This research brings no risks to you. No remuneration/compensation is offered and you will not incur any cost; however, the research results may be beneficial to research participants in many ways such as to identify gaps in current disaster-related communication in Sri Lanka.</p> <p>You will participate in this research by filling the questionnaire survey and you will be asked for your experience in disaster-related communication in Sri Lanka and its social media adaptation. Collected data will be analyzed and will be only used to obtain the outcomes of the research study.</p> <p>All the electronic data will be stored on servers located in the United States provided by the Survey Monkey Company during the study. It will only be available to researchers and the electronic data will be password protected. All published results of the study will contain only statistical or group data from which no individual participant can be identified. Raw data will be retained in a secure under researchers' control until the completion of the research project and after data will be destroyed.</p> <p>You are being asked to make a voluntary decision as to whether you wish to participate in this study. If you decide to participate, please click on the 'Next' button below. If you decide not to participate, or if you later decide to discontinue your participation, your decision will not affect the research. Upon request, a copy of the results will be made available to you. You will always be free to discontinue participation at any time during you filling the questionnaire survey; however, the data collected up to that time as a result of your partial participation will be used in the research.</p>	



2. General information about the respondents (Respondent Demographics)

* 1. What is your age?

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

* 2. What is your gender?

- Female
- Male
- Other (specify)

* 3. What is your Educational/Professional status?

- Undergraduate Student
- Postgraduate Student
- Academic
- Engineering
- Medical
- Legal
- Management
- Other (Please mention it in below text box)

* 4. Please select your District

Please state your DS Division here

* 5. For each of the following **Natural Hazards**, please indicate the frequency of occurrence in your area, from '**Never**' to '**One or two times per month**' .

	Never	One or two times in my life	One or two times per 10 years	One or two times per 5 years	One or two times per year	One or two times per six months	One or two times per month
Floods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landslides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cyclones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lightning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Droughts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquakes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Epidemics (Dengue, Malaria, Covid-19 etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildfires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pest attacks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tsunami	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other natural hazards (please mention them here with the frequency)

*6. For each of the following **Human-made Hazards**, please indicate the frequency of occurrence in your area, from 'Never' to 'One or two times per month'.

	Never	One or two times in my life	One or two times per 10 years	One or two times per 5 years	One or two times per year	One or two times per six months	One or two times per month
Industrial hazards (e.g.:chemical, radiological)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fire (e.g.: Building)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food and water contamination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Security threat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other human-made hazards (please mention them here with the frequency)



3. Current status of receiving disaster-related information to the community

To check the current condition in the use of traditional mass media to get information about disasters.

* 7. The following is a list of traditional media modes that you might use to access disaster-related information. Which is your preferred mode(s) of media to access disaster-related information?

Using the drop-down boxes, please rank from **(1) most preferred** to **(6) least preferred**.

If you do not have access to a mode, please select Not Applicable **(N/A)**.

<input type="text"/> Television <input type="checkbox"/> N/A
<input type="text"/> Radio <input type="checkbox"/> N/A
<input type="text"/> Newspaper <input type="checkbox"/> N/A
<input type="text"/> Public Announcement <input type="checkbox"/> N/A

☰

SMS

N/A

☰

From a responsible person in the area

N/A

8. If you use any other traditional modes of media to get disaster-related information, please mention them here (Except social media)

* 9. What are the things that you like when using the above modes of media to get disaster-related information? Please select all answers that apply.

- Easy to use
- High accuracy
- Easy to the understand the information
- Everyone can use

Other (Please mention them here)

* 10. What are the things that you don't like when using the above modes of media to get disaster-related information? Please select all answers that apply.

- Don't get information on right time
- Hard to get information during a disaster
- Need of other facilities to get of information (EX: Electricity)
- Hard to use with portable devices like Mobile Phones

Other (Please mention them here)



4. General use of social media applications

To identify the demography of the general use of social media applications.

* 11. Do you usually use any social media application (Social Media Platform or Messenger App)?

- Social Media Platforms (Ex: Facebook, Instagram, Twitter etc.)
- Messenger Apps (Ex: WhatsApp, Viber, Facebook Messenger etc.)

Yes

No



5. General users of social media applications

To get the information about the general users of social media

* 12. Please state the frequency of the usage, if you are using the below social media applications. Rate each of them from 'Few times per hour' to 'Never'.

	Few times per hour	Few times per day	Once a day	Few times per week	Less often	Never
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whatsapp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instagram	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Massenger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Imo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you use any other social media applications, please mention them and their usage here.

*13. Please state the frequency of your usual social media usage for the following purposes. Rate the frequency of each from **Very Low** to **Very High**.

	Not at all	Very Low	Low	Moderate	High	Very high
For entertainment purposes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For Educational purposes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To communicate with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get various information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To share information with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you use social media for any other purposes, please mention them here with the frequency.



6. Use of social media applications to get information about disasters

To check the current consumption of social media applications among the community in receiving disaster-related information?

* 14. Do you receive any disaster-related information via social media applications at present?

Yes

No



7. For respondents who use their social media applications to get disaster-related information

* 15. Please select the way you receive that information via social media.

- I purposely search them through social media applications usually
- I don't search them on social media intentionally. But I can be able to see them when I use my social media applications
- If you receive that information any other ways, please mention them here.

* 16. Please indicate your preference level for using the following social media applications to access disaster-related information, rating each application from **Very Low** preference to **Very High** preference.

	Very low	Low	Moderate	High	Very High
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whatsapp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instagram	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facebook Messenger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Imo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you prefer any other social media applications please mention them and preference level here.



8. General information about use of disaster-related information sources on social media

* 17. How did you get to know about disaster-related information sources on social media? Please select all answers that apply.

- Invitation from a friend through social media (Ex: Facebook friend invitation)
- Search on social media (Ex: Facebook search)
- General Internet Search
- A friend, family member or someone other than this told me

If you get to know about disaster-related information sources on social media any other way, please mention them here.

* 18. What kind of information do you usually get as disaster-related information from social media? Please select all answers that apply.

- Day today weather alerts
- Critical disaster warning alerts
- Traffic jam information (Road blockages)
- Requests and opportunities to offer help and aids
- General information about disasters
(Ex: how to respond, what are the precautions, evacuation processes and centres etc.)

If you receive any other kind of disaster-related information via social media, please mention them here.

* 19. What do you expect from disaster-related information on social media? Please select all answers that apply.

- Early warning about weather and disaster situations
- Information on my community
- Information on my family's community
- Information on other communities
- To share the information with others
- To offer help and aids

If you expect any other things from the disaster-related information on social media, please mention them here.

* 20. What are the things that you like regarding the disaster-related information on social media? Please select all answers that apply.

- Receiving information on time
- Receiving information via portable devices (Ex: Mobile phones, Tablet)
- Availability of information even in the absence of electricity
- Receiving information during a disaster

Other (please specify)

* 21. What are the things that you don't like regarding the disaster-related information on social media? Please select all answers that apply.

- Not being able to use for every person (Requirement of digital literacy)
- Not being able to use for every person (Requirement of PC, Smart phone or tablet)
- Occurrence of internet connection problems during disasters
- Increased risk of receiving misinformation

Other (please specify)



9. Identification of the current social media sources which disseminate disaster-related information

To check the user consumption of different social media information sources which disseminate disaster-related information

Note: Ignore the questions which if you are not using that particular social media application or information source



22. Select the **Facebook pages** from the following list managed by **Governmental Institutions** which you have liked (subscribed) to receive disaster-related information. Please select all answers that apply.

- Disaster Management Centre
- Health Promotion Bureau
- Department of Meteorology
- Irrigation Department
- NBRO
- National Dengue Control Unit
- News.lk (The Government Official News Portal)
- PMD News (President's Media Division)
- If you have followed any other Facebook pages managed by Governmental Institutions, please mention them here

*23. Please state the quality level of the services provided by the following **Governmental Facebook Pages**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not liked (subscribed) any page from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
Disaster Management Centre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health Promotion Bureau	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Department of Meteorology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irrigation Department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NBRO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Dengue Control Unit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News.lk (The Government Official News Portal)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PMD News (President's Media Division)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Facebook pages managed by Governmental Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

24. Select the **Facebook pages** from the following list managed by **Non-Governmental Institutions** which you have liked (subscribed) to receive disaster-related information. Please select all answers that apply.

- WHO Sri Lanka
- UNICEF Sri Lanka
- Sri Lanka Red Cross Society
- UN World Food Programme in Sri Lanka
- Sarvodaya
- U.S. Embassy Colombo
- If you have liked any other Facebook pages managed by other Non-Governmental Institutions, please mention them here

*25. Please state the quality level of the services provided by the following **Non-Governmental Facebook Pages**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not liked (subscribed) any page from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
WHO Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UNICEF Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sri Lanka Red Cross Society	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UN World Food Programme in Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sarvodaya	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U.S. Embassy Colombo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Facebook pages managed by Non-Governmental Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

26. Select the **Facebook pages** from the following list, managed by **News Media Institutions** which you have liked (subscribed) to receive disaster-related information. Please select all answers that apply.

- Ada Derana
- Newsfirst
- Hiru News
- Neth News
- ITN News
- BBC News (Any)
- Lankadeepa Online
- If you have liked any other Facebook pages managed by other News Media Institutions, please mention them here

* 27. Please state the quality level of the services provided by the following **News Media Facebook Pages**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not liked (subscribed) any page from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
Ada Derana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Newsfirst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hiru News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neth News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ITN News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BBC News (Any)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lankadeepa Online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Facebook pages managed by News Media Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

28. If you receive disaster-related information from the **Facebook Pages** you have followed which are operated by **Social Media Influencers (Web media journalists)** please mention them here.

29. Select the disaster-related **Facebook pages or Facebook groups** managed by the various **Community Groups** from the following list, which you have followed to get disaster-related information. Please select all answers that apply.

- Disaster Info Sri Lanka
- SL Disaster Relief
- කොරෝනා වර්දන Online ස්වේච්ඡා බලකාය
- කොරෝනා වසංගතය ගැන දැනුවත්වීමේ සංසදය
- කොරෝනා (Covid-19) නවතමු - Stop Corona (Covid-19)
- Covid19 Sri Lanka
- Global Sri Lankan Forum
- If you have followed any other disaster-related Facebook pages or Groups managed by the various community groups, please mention them here.

*30. Rank the quality of the above main information sources which disseminate disaster-related information via Facebook from **(1) highest quality of service to (5) least quality of service.**

If you have not liked (subscribed) any Facebook pages of the following main information sources, please select Not Applicable **(N/A)**.

<input type="checkbox"/> Governmental (Disaster Management Centre, Health promotion Bureau, Department of Meteorology etc.) N/A
<input type="checkbox"/> Non- Governmental (WHO Sri Lanka, UNICEF Sri Lanka, Sri Lanka Red Cross, Sarvodaya etc.) N/A
<input type="checkbox"/> News Media Institutions (Ada Derana, Newsfirst, Hiru News, Neth News, ITN News etc.) N/A
<input type="checkbox"/> Influencers (Web media journalists) N/A
<input type="checkbox"/> Community groups (Disaster Info Sri Lanka, SL Disaster Relief, Global Sri Lankan Forum etc.) N/A



31. Select the **Twitter Accounts** from the following list managed by **Governmental Institutions** which you have followed (subscribed) to receive disaster-related information. Please select all answers that apply.

- Disaster Management Centre
- Health Promotion Bureau
- Meteorology Sri Lanka
- National Dengue Control Unit
- PMD News (President's Media Division)
- News.lk (The official government news portal of Sri Lanka)

* 32. Please state the quality level of the services provided by the following **Governmental Twitter Accounts**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not followed (subscribed) any Twitter accounts from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
Disaster Management Centre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health Promotion Bureau	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meteorology Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Dengue Control Unit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PMD News (President's Media Division)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News.lk (The official government news portal of Sri Lanka)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Twitter accounts managed by Governmental Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

33. Select the **Twitter Accounts** from the following list managed by **Non-Governmental Institutions** which you have followed (subscribed) to receive disaster-related information. Please select all answers that apply.

- WHO Sri Lanka
- UNICEF Sri Lanka
- Sri Lanka Red Cross
- UN in Sri Lanka
- Sarvodaya Sri Lanka
- U.S. Embassy Colombo

If you have followed any other Twitter Accounts managed by other Non-Governmental Institutions, please mention them here

* 34. Please state the quality level of the services provided by the following **Non-Governmental Twitter Accounts**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not followed (subscribed) any Twitter accounts from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
WHO Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UNICEF Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sri Lanka Red Cross	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UN in Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sarvodaya Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
U.S. Embassy Colombo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Twitter accounts managed by Non-Governmental Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

35. Select the **Twitter Accounts** from the following list, managed by **News Media Institutions** which you have followed (subscribed) to receive disaster-related information. Please select all answers that apply.

- Ada Derana
- Newsfirst.lk Sri Lanka
- Hiru News
- Neth News
- BBC News (Any)
- Lankadeepa

If you have followed any other Twitter Accounts managed by other News Media Institutions, please mention them here

*36. Please state the quality level of the services provided by the following **News Media Twitter Accounts**, regarding disaster-related communication in Sri Lanka by rating each page from **Very Low** to **Very High**.

If you have not followed (subscribed) any Twitter accounts from the following list please select **Not Applicable**.

	Very low	Low	Moderate	High	Very High	Not Applicable
Ada Derana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Newsfirst.lk Sri Lanka	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hiru News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neth News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
BBC News (Any)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lankadeepa Online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have liked any other Twitter accounts managed by News Media Institutions other than in the above list, please state the quality level of them, regarding disaster-related communication in Sri Lanka as above.

37. If you receive disaster-related information from the **Twitter Accounts** you have followed which are operated by **Social Media Influencers (Web media journalists)** please mention them here.

38. If you receive disaster-related information from the **Twitter Accounts** you have followed which are operated by different **Community Groups** please mention them here.

*39. Rank the quality of the above main information sources which disseminate disaster-related information via Twitter from **(1) highest quality of service to (5) least quality of service**.

If you have not liked (subscribed) any Twitter Accounts of the following main information sources, please select Not Applicable **(N/A)**.

<input type="checkbox"/> Governmental (Disaster Management Centre, Health promotion Bureau, Department of Meteorology etc.) N/A
<input type="checkbox"/> Non- Governmental (WHO Sri Lanka, UNICEF Sri Lanka, Sri Lanka Red Cross, Sarvodaya etc.) N/A
<input type="checkbox"/> News Media Institutions (Ada Derana, Newsfirst, Hiru News, Neth News etc.) N/A
<input type="checkbox"/> Influencers (Web media journalists) N/A
<input type="checkbox"/> Community groups N/A



* 40. Do you receive any disaster-related information via **WhatsApp** at present?

- Yes
- No

41. If you receive disaster-related information via **WhatsApp** please mention about the sources (Individual users or Groups) here.

Individual WhatsApp Users

WhatsApp Groups (Ex: Disaster Info SL)



* 42. Do you receive any disaster-related information via **Instagram** at present?

- Yes
- No

43. If you receive disaster-related information from any **Instagram Accounts** you followed please mention about them here.

Other Social Media Applications (IMO, VIBER, Snap Chat, etc.)



44. If you receive disaster-related information from any **Other Social Media Applications** please mention about them here.



10. User perception of disaster-related information and sources on social media

To check the respondents' perception of the quality of disaster-related information on social media by considering several parameters.

Accuracy

* 45. What is your first reaction when you received disaster-related information via social media?

- I check the accuracy before responding to that information
- I don't check the accuracy before responding to that information
- Other (please specify)

*46. If you check the accuracy, which of the following social media information sources do you check the information provided by?

If you don't follow any of the following social media information sources, please select **Not Applicable**.

	I never cross check the accuracy of the information	Yes, I always cross check the accuracy of the information	Yes, I cross check the the accuracy of the some of information	Not Applicable
Governmental (Disaster Management Centre, Health Promotion Bureau, Department of Meteorology etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-Governmental (WHO Sri Lanka, Unicef Sri Lanka, Sri Lanka Red Cross Society, Sarvodaya etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News Media (Ada Derana, Hiru News, Newsfirst, BBC Sinhala etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Media Influencers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Community Groups (Disaster Info Sri Lanka, SL Disaster Relief, කොමරිනා මර්දන Online ස්වේච්ඡා බලකාය etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 47. **If you check** the accuracy of the information before responding, what steps would you take to do so? Please select all answers that apply.

- I verify the information from the verified governmental information sources available on the internet (Governmental websites, Governmental social media etc.)
- I verify the information from other modes of media (e.g. TV, Radio, etc.)
- I will verify the information by contacting those responsible
- Not Applicable

If you use any other measures to verify the information, please mention them here.

*48. Using the drop-down boxes, please rank from **(1) most accurate** to **(5) least accurate** the following disaster-related information sources available in social media.

If you don't follow any of the following social media information sources, please select Not Applicable **(N/A)**.

<input type="text"/>	Governmental (Disaster Management Centre, Health Promotion Bureau, Department of Meteorology etc.)	<input type="checkbox"/>	N/A
<input type="text"/>	Non-Governmental (WHO Sri Lanka, Unicef Sri Lanka, Sri Lanka Red Cross Society, Sarvodaya etc.)	<input type="checkbox"/>	N/A
<input type="text"/>	News Media (Ada Derana, Hiru News, Newsfirst, BBC Sinhala etc.)	<input type="checkbox"/>	N/A
<input type="text"/>	Social Media Influencers	<input type="checkbox"/>	N/A
<input type="text"/>	Community Groups (Disaster Info Sri Lanka, SL Disaster Relief, කොරෝනා මර්දන Online ස්වේච්ඡා බලකාය etc.)	<input type="checkbox"/>	N/A

49. If you do not check the accuracy, what are the reasons for that?

- I don't want to check because I believe all the information on social media
- I don't want to check because I don't respond to the information on social media

If you have any other reasons please mention them here.

Usefulness






* 50. How disaster-related information on social media is useful in your day to day life? Please select all answers that apply.

- It is helpful to plan the works on the day (Ex: General weather information)
- It is helpful to get ready (Safety Precautions, Evacuating, collecting foods etc.) before occurring a disaster
- It is helpful to get to know about what should do after occurring a disaster (Ex: Rehabilitations, Aids etc.)
- It is helpful to get to know about what should do during a disaster (Ex: Safety Precautions etc)
- It is helpful to provide and request help and aids from the relevant parties
- I don't care whether disaster-related information on social media is useful or not

If there are any other ways that that disaster-related information on social media is useful for you please mention them here.

* 51. Using the drop-down boxes, please rank from **(1) most useful** to **(5) least useful** the following disaster-related information sources available in social media.

If you don't follow any of the following social media information sources, please select Not Applicable **(N/A)**.

 Governmental (Disaster Management Centre, Health Promotion Bureau, Department of Meteorology etc.)
 Non-Governmental (WHO Sri Lanka, Unicef Sri Lanka, Sri Lanka Red Cross Society, Sarvodaya etc.)
 News Media (Ada Derana, Hiru News, Newsfirst, BBC Sinhala etc.)
 Social Media Influencers
 Community Groups (Disaster Info Sri Lanka, SL Disaster Relief etc.)

Timeliness (Receiving the information in a favourable or useful time/availability of the information when needed.)



52.

- Using the drop-down boxes in the **first column**, please rate from **Very Low** to **Very High** the up-to-date of the information available on the following social media information sources.
- Using the drop-down boxes in the **second column**, please rate from **Very Low** to **Very High** the difference between the time which is information expected and the time which is information readily available on the following social media information sources.

	Up-to-date	Time difference
Governmental (Disaster Management Centre, Health Promotion Bureau, Department of Meteorology etc.)	<input type="text"/>	<input type="text"/>
Non-Governmental (WHO Sri Lanka, Unicef Sri Lanka, Sri Lanka Red Cross Society, Sarvodaya etc.)	<input type="text"/>	<input type="text"/>
News Media (Ada Derana, Hiru News, Newsfirst, BBC Sinhala etc.)	<input type="text"/>	<input type="text"/>
Social Media Influencers	<input type="text"/>	<input type="text"/>
Community Groups (Disaster Info Sri Lanka, SL Disaster Relief etc.)	<input type="text"/>	<input type="text"/>



*53. What do you think as the most important quality indicator(s) among from Accuracy, Usefulness and Timeliness that you expect from the disaster-related information on social media?

Using the drop-down boxes please rank from **(1) most important** to **(3) least important**



Accuracy



Usefulness



Timeliness



11. Comparison and Suggestions

* 54. Do you think social media applications are better than traditional media to communicate information about disasters?

Yes

No

Please state the reasons for your answer here

55. What are further improvements that you suggest to develop the communication of disaster-related information through social media?



12. For respondents who don't use any kind of social media applications

To gain information about the Non-Users of social media applications

56. Why don't you use any Social Media Application usually? Please select all answers that apply.

- I don't have any device (Computer, Tablet, Smart Phone) to use social media application
- I don't have a good internet connection facilities
- I don't know how to use the social media application
- Not interested
- Other (please specify)

57. If you wish to use any social media application in future, please mention them here



13. For respondents who don't use their social media applications to get disaster-related information

To get the information about social media users, who don't use their used social media application to get information about disasters.

58. Why don't you get any disaster-related information via your social media applications? Please select all answers that apply.

- I don't know any disaster-related information sources on social media
- I don't sure the quality of the disaster-related information in terms of accuracy, reliability, usefulness, timeliness
- I don't want use my social media applications to get disaster-related information
- Other (please specify)

59. If you wish to use your social media applications to get disaster-related information in future, please mention them here.