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Positive Determinism of Twitter Usage Development in Crisis Communication: Rescue and Relief Efforts after the 6 February 2023 Earthquake in Türkiye as a Case Study

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Abstract: This study examined the impact of Twitter usage development in crisis communication in Türkiye during the 6 February 2023 by showing the development of its use during the 1999 Izmit and 2000 Izmir earthquakes. As well as its usage in the 48 h following the 2023 earthquake. It found that Twitter's positive determinism has evolved over time from gathering information to actively supporting victims' rescue. Twitter was crucial for finding casualties and providing on-the-ground updates during critical moments, confirming the media's surveillance function. During the first 48 h of the 2023 earthquake, Twitter significantly affected the rescue and relief activities, enabling individuals trapped beneath the debris to contact, seek, and receive assistance. Twitter's importance has increased in political communication by opinion leaders and government authorities, and President Erdoğan's engagement via Twitter was critical in expressing solidarity and coordinating rescue and relief efforts. This study concluded that Twitter has become an indispensable tool for obtaining and disseminating information, as well as aiding and identifying individuals in need. It was widely used by official accounts, informational accounts, and citizens, and effectively aiding rescue and relief efforts, especially in the first 48 h after the disaster.

Keywords: crisis communication; Türkiye; Twitter; social media; technological determinism; Türkiye–Syria 2023 earthquake; relief and aid; disasters and crises; AFAD; artificial intelligence

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1. Introduction

Media have a general responsibility in general and particularly the case in times of crises and disasters by highlighting the most important issues in societies. In this regard, people see that nontraditional media are much more effective than traditional media when following up on people's rights issues (Aldamen 2017). Social media also have great responsibility and an important role to play, especially with the rise in social media usage in modern times, which increased the need for rapid information transmission and interactive interaction among the public. In times of disaster, the tendency to turn to social media as a source of news has skyrocketed (Mitcham et al. 2021). According to Mavrodieva and Shaw (2021), the role of social media in disaster response and recovery has become increasingly prominent in the last decade.

During a crisis, social media platforms may provide several benefits and play an important role in a variety of ways. Social media may aid in the organization of relief operations and rally community support. Individuals may use platforms to organize fundraising campaigns and volunteer events, as well as encourage contributions. This communal participation has the potential to dramatically increase the effect of crisis response activities (Goolsby 2010).

Social media platforms may be utilized to enhance public awareness about hazards and disasters while also giving timely and relevant information to those impacted. Social media platforms allow groups and authorities to monitor crises in real time, assisting them

in gathering information and gaining situational awareness. In addition, during a crisis, social media may aid in the identification of survivors and victims, as well as assist in the coordination of rescue and relief activities.

According to Eriksson (2018), social media are effective in crisis communication when they are used to (1) initiate discourse and choose the appropriate message, source, and time; (2) perform pre-crisis work and get a grasp of social media logic; (3) monitor social media; (4) prioritize conventional media in crisis circumstances; and (5) completely focus on strategic crisis communication.

The use of social media in crisis communication can boost public resilience, assisting individuals in coping with the crisis and avoiding panic. Bukar et al. (2022) stated that community resilience after a catastrophe has become critical in order to avert panic. In contrast, social media use has become useful in improving public resilience. Thus, for effective social media crisis communication, crisis management and communication operations should pay greater attention to these elements.

During a crisis, social media platforms promote a feeling of community and give emotional support by allowing impacted persons to connect, exchange stories, and provide mutual help. People may now receive news, share information, and voice their opinions on social media platforms thanks to the growing availability of smart mobile devices and Web 2.0 services. However, these platforms also facilitate rumors and affect emotions. Facebook and Twitter were used to disseminate information about COVID-19, offer guidance and instructions, correct misconceptions, and promote public health initiatives including mask usage and social isolation. Despite the disparity in knowledge across nations, they were also successfully employed in online learning. Since social media platforms depended on the media to keep their studies updated throughout the pandemic, students were able to create solutions to control this dependence without it having a detrimental impact on their academic performance (Mohammad and Aldamen 2023). A study by Gu et al. (2022) on the Chinese platform Sina-Weibo revealed that verified accounts had the strongest interactions with users during emergencies. Government agency news had a favorable user effect, although trustworthy experts and national media were favored. This emphasizes the significance of trust and social media platforms in crises and providing advice to government entities.

Social media platforms may use crowdsourcing to collect real-time information from the public, which may be useful for crisis response and decision-making. According to Saroj and Pal (2020), emergencies stemming from natural disasters, such as tsunamis, earthquakes, floods, and hurricanes, cause significant social and economic loss, particularly for low-income economies. This study analyzed the relationship between emergencies and online social media platforms like Twitter, Facebook, and YouTube. It examined the impact of emergencies on social media, namely how sudden surges of posts can be extracted and processed to create situational awareness and how social media posts can help government agencies prepare and manage emergencies.

Social media platforms enable the quick and extensive transmission of essential information, reaching a huge audience and aiding in the fight against disinformation and rumors. During a crisis, social media provides a platform for sense giving and sense making, helping individuals and organizations analyze and understand information. According to Mirbabaie et al. (2020), the coronavirus disease 2019 pandemic created a split between official "command and control" and informal social media-activated self-organizing information and communication systems used for crisis management decision making. Social media skepticism affects catastrophe information distribution because it involves alterations in media perception and involvement, as well as changes in how individuals and organizations make sense of information in crucial times. To date, the concept of sense giving has received little attention in this sector. However, the results obtained to date highlight the relevance of information-rich people in communication networks and how they might use their influence to minimize social media distrust and enhance sense making in emergencies such as the coronavirus disease 2019.

Organizations and authorities can use social media to connect directly with stakeholders such as the public, the media, and relevant agencies, allowing for fast updates and instructions. Derani and Naidu (2016) found that social media is a useful tool for informing the public and addressing current concerns. Its primary purpose is to disseminate urgent information and share it with a wide range of people. In a crisis, the strategic sharing of information is crucial to control the situation and prevent the crisis worsening. This also helps reduce the potential tarnishing of an institution's image. However, accessing secondary data, such as an organization's website and documentation, can lead to inaccurate or outdated information. This study emphasized the importance of utilizing social media as part of crisis communication strategies for industry practitioners.

The study by Mihunov et al. (2022) explained the use of social media and the impact of deploying such technologies in high-risk scenarios, in this case, Hurricane Harvey, which occurred in the United States in 2017. The researchers wanted to collect user-generated data and information in order to enhance disaster surveillance operations. The study was separated into two sections: topic model development and feature extraction. The researchers first aimed to collect data in order to identify specific disaster-related concerns, such as people seeking aid and perceptions of infrastructure damage. In the second stage of the investigation, feature extraction software was utilized to evaluate the material's many qualities, such as time and place, particular position, and occurrence. Using the two-step approach, the researchers were able to gain a comprehensive picture of the people's emotional and physical conditions, as well as the extent of infrastructural damage. Finally, the study established the use of social media data in high-risk scenario control and recommended for additional research on the issue as well as progress of the technology behind it for future applications.

During crisis occurrences, social media platforms are increasingly being used as sources of news, altering traditional media reporting and delivering rapid information to the public. Baker-Dowdell (2013) highlighted the impact of social media on journalistic practice, particularly in crisis event reporting. The frantic and emotional character of crisis situations, combined with a 24 h news cycle, highlights the immediate information source of social media. The study examined two Australian bushfire case studies, focusing on "The Age and The Mercury's coverage of the events". Content analysis and research interviews with editors provided context for the editorial decisions surrounding social media use. This study highlighted the acceptance of traditional media agencies now embracing social media messages as a reliable source of news, and highlighted the future evolution of journalistic practice.

2. Technological and Communication Determinism

2.1. The Theoretical Background

As a reductionist theory, technological determinism claims that a society's technological progress is guided by its internal efficiency logic, which determines the molding of social structures and cultural values (Héder 2021). According to this perspective, technology influences civilizations and cultures by significantly affecting human behaviors and social structures. Theorists of technological determinism believe that technology acts independently of other forces and has significant effects on both the macro and micro levels of society. The fundamental drivers of social change and growth are also technical advancements.

Throughout history, numerous thinkers have presented and debated the notion of technological determinism. American sociologist and economist Thorstein Veblen (1857–1929), who linked technology to significant social shifts, stressing the significance of technical innovation in altering economic and social systems, is one noteworthy figure associated with this approach. He invented the phrase "technological determinism" to describe a branch of determinism in sociology (Veblen 1921).

Karl Marx, the German philosopher and economist, also developed the notion of technical determinism, which says that a society's technology follows its own internal logic of efficiency and determines the evolution of social structures and cultural values. However,

it is critical not to take Marx's views as absolute or inflexible technical determinism, because he accounted for the intricacies of historical evolution and social interactions within the framework of technological impact. Marx's contributions to the notion of technological determinism have had a lasting influence on current thought and remain essential in examining the interaction of technology, society, and human life. Marx contended that technological advances, particularly in productive technology, had a substantial influence on human social connections and organizational structures. He argued that a society's technological and economic foundation eventually influences its social interactions and cultural practices. This concept of technological determinism has been engrained in contemporary culture, where it is widely held that fast increasing technologies have a substantial impact on human life (Smith and Marx 1994). Marx's notion of technological capability and economic organization was critical in comprehending the significance of technological transformation in contemporary civilizations. He observed that modern civilizations are fundamentally different from past ones because of the quick and continual technological improvements that have become an integral element of modern life. While earlier societies experienced sluggish and occasional technical developments, Marx remarked that, in the present, one new technology follows another in rapid succession, touching different elements of human existence (Bimber 1990). It is crucial to highlight that disputes over technological determinism differ, and Marx's perspective fits with one that stresses the role of technology on the evolution and structure of society. While some interpreters see technological determinism as primarily cultural or dependent on unintended effects, Marx's ideas coincide with the premise that technology itself plays a substantial influence in determining social relations (Sherman 1981).

The social construction of technology, as defined by Winner (1980), asserts that "what matters is not the technology itself, but the society in which it is embedded". The phrase by Langdon Winner captures the heart of the social construction of technology (SCOT). The idea contends that the social environment in which technical objects are generated and utilized influences their development and usage. Thus, it is important to consider not just the technological characteristics or capabilities themselves, but also how they are ingrained in society, including the values, norms, and power dynamics that surround their invention and execution (Winner 1993). Langdon Winner's arguments dispute the notion of technological determinism, which holds that technology changes society and human behavior independently. Instead, he highlights the need to addressing technology's societal ramifications and influence. The phrase emphasizes the importance of critically analyzing and comprehending the social environment in which technology functions in order to better assess its impacts and repercussions on persons and communities.

Marshall McLuhan, a Canadian communication theorist, was also influential in the creation of technological determinism. McLuhan (1964) notably stated in his groundbreaking book "Understanding Media: The Extensions of Man", that the medium via which information is communicated alters human perception and influences social behavior.

McLuhan (1962) suggested an interesting notion in his book, "The Gutenberg Galaxy", that human history may be split into four separate periods. McLuhan's most important forecast concerned the approaching electronic era. He saw this century as one in which electronic media and communication technology will predominate, resulting in a fundamental shift in human connections and information distribution. McLuhan made a foresighted forecast regarding the possible presence of the Internet in his book. He predicted the creation of a global community enabled by electronic media, which would connect individuals from all over the world and allow knowledge to be widely and instantly communicated. Computers are a "cool" technology that fosters interactivity and involvement, allowing everybody to contribute to the global community and access massive amounts of knowledge, according to McLuhan.

McLuhan highlighted in his writings how the emergence of various media, both "hot" (such as radio, cinema, and books) and "cool" (such as television, telephone, and speech), affects subjectivity and meaning generation. He underlined that certain media have fixed

meanings and link people via shared experiences (hot media), whilst others have flexible meanings that vary depending on the audience (cool media). McLuhan also investigated the link between technology and subjectivity, building on Freud's study of narcissism to comprehend the interaction between the self and tools.

Though McLuhan could not foresee the Internet in its current form, he got surprisingly close to comprehending the technologically driven society we live in today. He acknowledged electronic media's transformational influence on culture and society, emphasizing the importance of the medium itself in altering how information is viewed and consumed ("The medium is the message").

2.2. Technological Determinism and Social Media in Crisis Management and Communication

Technological determinism also has an impact on the development and implementation of crisis management techniques. According to Veil et al. (2011) and Palen and Liu (2007), social media data analytics, artificial intelligence, and machine learning are increasingly being used to monitor and respond to emergencies.

The belief that the development and use of social media platforms has profoundly altered the way companies and people manage communication during times of crisis is referred to as the technological determinism of social media use in crisis communication. Because of its enormous reach and real-time capabilities, social media, as represented by platforms such as Twitter, Facebook, and Instagram, has become a vital instrument for crisis communication (Cheng 2018).

Eriksson (2018) found that organizations have realized the potential of social media for crisis communication and have investigated several ways for efficiently managing social-mediated situations. These techniques may alter depending on the stage of a crisis. During the crucial period, for example, social media may be used to increase public awareness of dangers and crises, monitor the situation, and identify survivors and casualties. Organizations have also been urged to adopt proactive social media strategies during non-crisis times to guarantee readiness in the event of a crisis. According to (Cheng 2018), digital security breaches and unfavorable new media publicity have led to organizational crises, emphasizing the need of efficiently managing social media platforms.

While social media has advantages in crisis communication, it also has drawbacks. The ease with which information may be shared can lead to the quick spread of rumors or disinformation, thereby intensifying situations. Furthermore, because social media interactions are rapid and public, corporations must respond quickly and ethically, as their activities may be evaluated by a worldwide audience.

The technological determinism of social media use in crisis communication demonstrates the enormous influence of social media platforms on how crises are managed and communicated in the digital era. Organizations must modify their crisis communication strategy to capitalize on the benefits of social media while remaining mindful of the hazards to reputation and brand image.

During a crisis, technological determinism can boost the collective action on social media. The use of hashtags, digital activism, and online organizing (Bennett and Segerberg 2013) can open up hitherto unseen avenues for citizen participation and mobilization.

The impact of social media on crisis communication has been noteworthy; nevertheless, some claim that social media's influence is driven by socio-political and cultural elements as much as technology (Chadwick 2017). During a crisis, social media improves connectedness between individuals, communities, and relief organizations. This connection allows for more efficient communication, allowing impacted people to seek aid, report their condition, and coordinate relief efforts (Austin et al. 2012).

2.3. Twitter's Positive Determinism in Crisis Communication

Social media has been acknowledged for its role in developing situation awareness during and after crises, with platforms such as Twitter playing an important role in sharing information and identifying key communicators (Hornmoen and Backholm 2018).

Ceccato and Petersson's (2022) study investigates how civic society in rural Sweden utilizes social media to assist local searches and information sharing. Geographic information systems and visualization techniques were utilized in the study. The study revealed a globally dispersed pattern of information sharing about missing persons, with emotional content being more prevalent. It was stated that the effectiveness of social media as a resource for solving issues might have been exaggerated in terms of locating missing people. Additionally, tweets mentioned the importance of nonprofit groups in rural areas but may affect existing stakeholder networks.

Twitter is one of the most extensively used social media tools for tracking real-time information. Pourebrahim et al.'s (2019) study attempted to explain the use of Twitter as a primary mode of communication during Hurricane Sandy 2012, which damaged nations from the Caribbean to the United States. This study was based on tweets concerning Hurricane Sandy posted on the Twitter platform. Storm-affected coastal counties in New York, New Jersey, and Connecticut provided geo-tagged Twitter data. During Hurricane Sandy, survey data from the inhabitants of coastal counties in Connecticut, New Jersey, and New York were collected for the study. Residents were polled on the sources of information they used to stay up to speed on the tragedy, as well as the types of information they shared. Furthermore, Twitter data were collected and divided into two categories. The first dataset contains tweets with Sandy-related keywords. The second collection was made up of geotagged tweets from New York, New Jersey, and Connecticut. A number of prominent figures from many disciplines discussed Hurricane Sandy on Twitter. That made it easy for emergency managers to interact and exchange information with one another. Government bodies, on the other hand, mostly utilized Twitter to connect with their followers in a one-way fashion.

Inal Onal et al. (2022) conducted a study to investigate AFAD (Afet ve Acil Durum Yönetimi Başkanlığı), the Disaster and Emergency Management Authority's use of Twitter in 2021, specifically between 1 January 2021 and 31 December 2021. The study examined how disaster communication may be achieved on Twitter and how successfully information can reach the public via tweets from the AFAD presidency. There were 580 tweets linked to disasters discovered in total, with 88 tweets unrelated to disasters. According to the kind of the occurrence, the tweets were divided into three categories: pre-disaster (risk reduction and preparation), disaster (response), and post-disaster (recovery). When it comes to risk communication, a review of AFAD's social media showed that it took a more dynamic approach and largely used social media to provide data. The investigation also discovered that AFAD utilized its Twitter account to provide brief data on risk reduction, response, and recovery activities following earthquakes and weather events. The mailers also include details about forthcoming training events and seminars. While this type of communication was successful at instilling individual risk perception and ability for preventive and resilience, it was poor at fostering risk communication conversations and public participation.

Truong et al. (2014) conducted a study on data extraction from Twitter databases following natural disasters. The study looked at how information from this platform may be obtained, such as damage, aid requests, volunteer activities, and general situational awareness. The study recommended creating classifiers to detect certain phrases, hashtags, tweet frequency, and linguistic patterns. The researchers also examined tweets from three natural disasters: an Oklahoma tornado, a typhoon named Haiyan, and Hurricane Sandy. Using classifiers and manually classifying the data, the researchers demonstrated the need for such a tool as well as the validity of the proposed model. The study also evaluated the difficulties of gathering social media data, taking into account the redundant information, noise, and dynamic nature of social media. Finally, the study emphasized Twitter's potential throughout the crisis and the need for better user-friendly tools for evaluating these data. Furthermore, the study outlined the challenges that potential data collectors and academics may have while collecting data from social networking sites.

Alam et al. (2018) aimed to bridge the gap in collecting Twitter data by developing Crisis MMD, a platform for real-time data collection specifically designed for natural disasters. The study went into the method used to build this application, which leverages Twitter API keys to collect tweets during natural disasters. Other types of evidence, such as images and films, were also sought by the researchers in order to gain a better understanding of what occurred. The study's aim was to emphasize the use of software like Crisis MMD in developing aid and rescue plans. The program may provide multimodel datasets with tweet text, media, location, and timestamps. Furthermore, the study stressed the importance of developing applications like Crisis MMD all over the world due to their great potential for real-time crisis monitoring. Overall, the study depicted Crisis MMD as a valuable software for evaluating disaster-related tweets, particularly for people in danger zones and aid and relief groups attempting to reach them.

3. The Twitter's Use during Earthquake Disasters

During natural disasters such as earthquakes, social media networks allow for real-time information distribution. Individuals and organizations may swiftly exchange updates, safety instructions, and emergency alerts, keeping impacted populations informed and allowing them to make prompt decisions (Austin et al. 2012).

In 2021, Gulesan et al. (2021) explored the use of social media as an emergency tool in complex circumstances, such as post-earthquake issues and volunteer organizations. The researchers were attempting to determine what kind of potential social media has for engaging communities in the aftermath of earthquakes. The study suggested combining government technological advancements with current disaster response strategies in order to build an integrated social media platform that would aid authorities in acquiring real-time information. This collaborative strategy intended to underline the importance of merging technologies and social media to strengthen the community's resilience in the face of calamities such as the earthquake.

On 12 January 2010 on the West Indian island of Hispaniola, southwest of the Haitian capital of Port-au-Prince, a large scale earthquake hit, measuring at 7.0 magnitude and followed by two 5.9 and 5.5 aftershocks. In the days that followed, there were several aftershocks, including one on 20 January 2010 that had a magnitude of 5.9. As a result, the country has been left in ruins, with crumbling buildings, failure of electrical power and communication lines. It was analyzed that over three million people were affected and, as stated by the Haitian government official report; there were over 316,000 deaths (Pallardy 2023).

During the 2010 Haiti earthquake, Twitter served as an information source, but limited due to low usage in the affected area (Epatko 2010). Mass evolvement and mobilization over Twitter and social media did not occur.

One of the early studies that examined the use of Twitter during a natural disaster was conducted in the aftermath of Japan's earthquake and tsunami in 2011. This study provided valuable insights into how, during the crisis, Twitter served as a venue for information sharing and communication. According to the analysis of Twitter usage during the Great East Japan Earthquake in 2011, negative emotions like concern and anxiety were more likely to be expressed online than neutral or positive ones (Gruda et al. 2022).

Furthermore, on 25 April 2015, a massive 7.6 magnitude earthquake struck Nepal near the city of Kathmandu. Following the initial shock, two more large aftershocks occurred with the magnitude of 6.6 and 6.7 one day after the main event. Several days later, another devastating aftershock measuring at 7.3 magnitude struck 76 km (47 miles) east-northeast of Kathmandu. The official report stated that the deaths of 9000 people were confirmed with 16,800 injured and 2.8 million displaced. The earthquake and the aftershocks contributed to the damage of already old and brittle buildings, especially villages and densely populated areas. Initial damages ranged from 5000 billion to 10,000 billion dollars (Rafferty 2023). During the 2015 Nepal earthquake, Twitter was used as a source of social support and

mobilization, where individuals have utilized Twitter in post-earthquake period facilitation donations and international aid (Malasig and Quinto 2016).

Additionally, on 4 July 2019 at 10:34 a.m. local time, an M6.4 earthquake occurred, with the epicenter 18.2 km of Ridgecrest, California. Another earthquake measuring at 4.0 on a Richter scale quickly followed the 6.4 earthquake (Yue et al. 2021). Thirty-four hours later, at the distance of 11k North West of the M6.4 event, an even larger earthquake occurred measuring at 7.1. This event measured as the largest earthquake in south California since 1999 (Yue et al. 2021). According to U.S. Geological Survey, the damages surpassed USD 1 billion (CEA 2019). The damages to the houses was minimal, likely due to the area homes being relatively new. However, there were damages to the mobile homes, and residents surrounding the epicenter area were left without water for number of days (CEA 2019). City officials announced that there were no deaths or major injuries and a total of four home fires occurred, most likely due to raptured gas lines (Woodyard 2019).

During the 2019 Ridgecrest earthquake, Twitter played a more dominant role as users were directly shared their content on the platform from the affected area. There is also a notable increase in media presence on Twitter sharing news and tweets about the affected region (Ahn et al. 2021). Table 1 summarizes the role of Twitter in three main earthquakes discussed above.

Table 1. The Role of Twitter in the three Earthquakes discussed herein.

Earthquake	Year	Location	Use of Social Media
Haiti earthquake	2010	Haiti	- Twitter served as an information source, but faced challenges due to low Internet usage before the earthquake and the interruption of telecommunication services.
			- Other online disaster response tools like People Finder and "Open Street Map" were used to offer help and rally volunteers effectively.
			- Twitter was primarily used for citizen journalism, providing up-to-date news, but showed limitations in rescue and relief efforts due to low Twitter usage in the area and the loss of communication lines.
Nepal earthquake	2015	Nepal	- Most tweets came from outside Nepal, serving as a source of social support and providing informational news and communication.
			- Twitter played a crucial role in post-earthquake period, aiding in organizing help and support, sharing relevant information, and facilitating donations.
Ridgecrest earthquake	2019	Ridgecrest, CA, USA	- Dominant use of Twitter during the earthquake period.
			- Users shared their stories, prepared emergency kits, and offered funding and hope to affected areas.
			- Media companies tweeted videos and content related to the earthquake's effects, while users focused on the occurrence and location of the earthquake.
			- Analysis of events earned the most loves and retweets, with popular subjects including "breaking news with video materials" and "support and preparedness".
			- Limited use of Twitter due to the destruction of Internet access in Nepal.

4. The Earthquake Disasters in Türkiye

On 17 August 1999, a devastating 7.6 magnitude earthquake struck the area northwest of Türkiye, specifically Koaceli, Izmit, also known as the Kocaeli earthquake or Gölcük earthquake. The earthquake caused up to USD 6.5 billion in property loss and USD 15–USD 20 billion, including indirect and secondary losses (Reilinger et al. 2000). The earthquake caused major destruction in the affected regions, such as in Izmit and Istanbul, resulting in approximately 17,322 deaths and 50,000 injured (Sucuoğlu 2000). Accordingly, with the rescue and relief efforts, the disaster caused the community to mobilize on both the national and international levels. Moreover, the earthquake of 1999 prompted the country to improve disaster response strategies and consider implementing better building codes and standards for the future.

Furthermore, an earthquake with a magnitude of 6.6 hit the western provinces of Izmir, on Friday 30 October 2020, at 2:51 p.m. local time. The earthquake struck with the epicenter of 13 km northeast of the island Samos in Greece (Turkish Red Crescent 2020). Following the earthquake, the additional 277 aftershocks occurred, with 24 being more than 4.0 on a Richter scale. According to Hürriyet Daily News (2021), 24 buildings collapsed, 114 people were killed, and over 1000 were injured. Additionally, 107 people were rescued alive from the rubble in the aftermath. Moreover, the post-earthquake examinations concluded that 630 buildings were severely damaged, 605 mildly damaged, and more than 8000 suffered lighter damage (Hürriyet Daily News 2021). Table 2 below provides a summarized overview of the two catastrophic earthquakes in Türkiye.

Table 2. Two previous earthquakes in Türkiye.

	Earthquake	Time	Place	People Killed	People Injured	Damages
1	İzmit (Gölcük) Earthquake	17 August 1999	Kocaeli, Türkiye	17,000	50,000	Extensive infrastructural damage, including the collapses of bridges and severe damages to the roads
2	İzmir Earthquake	30 October 2020	Izmir, Türkiye	116	1034	Extensive damage to buildings, including collapsed structures

A 7.8 magnitude earthquake occurred in southern Türkiye close to the Syrian border on 6 February 2023. An earthquake with a magnitude of 7.5, located about 59 miles (95 km) to the southwest, occurred about nine hours later. The earthquake had a terrible effect, causing buildings to collapse and extensive devastation (Purvis 2023). Thousands of individuals were killed, and the death toll topped 49,000. Türkiye reported about 43,000 dead, while the number of casualties in Syria was not specified. These earthquakes, the strongest in Türkiye in more than 80 years, showed the region's increased vulnerability. According to AFAD, more than 11,000 aftershocks occurred as of 1 March. The aftershocks are predicted to continue for some time. These earthquakes had a significant impact on the region, causing widespread devastation and loss of life.

The earthquake prompted a large humanitarian response. Over 105 nations and 16 international organizations have promised their support and humanitarian assistance to the victims. Search and rescue teams from many nations assisted, and monetary help was supplied. However, due to Western sanctions and political constraints, outreach to Syria has been less enthusiastic.

The earthquake had a massive effect on the impacted populace. Because of the catastrophe, many people lost their homes, and millions were displaced. The rehabilitation and rebuilding process was predicted to take years and the entire scale of the loss will not be known for decades (Holmes et al. 2023).

According to officials, nearly 46,000 people were killed in the two countries (Bilginsoy and Fraser 2023). Furthermore, the Syrian Civil Defense reported that 1900 structures were entirely demolished in northern Syria because of the earthquake (Reliefweb 2023). According to UNICEF estimates, over 50,000 people have been killed, and millions have been forced to flee their homes owing to the potential for danger and damage. Rescue and relief activities in the impacted region have been ongoing 24/7 to aid those still trapped beneath the rubble and to offer survivors shelter, food, and water.

By providing information regarding the importance of the use of Twitter in times of crises and disasters and regarding the recent earthquake in Türkiye, this study tries to highlight the importance of online community involvement in crisis communication. Furthermore, this study aims to demonstrate how, by using social media platforms, particularly Twitter, as a tool, response and relief operations may significantly increase their efficacy, ultimately leading to improved crisis response strategies and the building of a more resilient community.

5. Methodological Framework

5.1. Problem of the Study

Twitter has been widely utilized as a means for communication between people impacted by various events, rescuers, and the broader public. Twitter has been heavily utilized throughout the Türkiye–Syria earthquake, both by people directly impacted and rescuers looking for individuals in need of aid. Twitter has played a vital part in coordinating the crisis response, with accounts such as AFAD updating social media followers about the growing crises in afflicted regions and providing real-time updates to survivors disclosing their whereabouts in the hopes of being rescued.

Toraman et al. (2023) investigated the role of social media in the recent tragedy of the 2023 Türkiye and Syria earthquakes, and discovered that there is a clear need for an interactive platform that would give lost and detained persons situational knowledge as well as disaster relief for rescue and donation efforts, using data from Twitter. By gathering Twitter messages, identifying those pleading for help, and extracting relevant hashtags, this study provided a detailed overview and categorization of the tweets related to the disaster. Therefore, the tweets were divided into two categories: "calling for emergency assistance" and "not calling for help". In the tweet classification tool demonstration, 1000 tweets were used to simulate a Twitter stream. According to the study, the system and interactive tool were designed to perform the following tasks: Twitter collection, tweet categorization, entity tagging, post processing, geolocation retrieval, and visualization tracking the victims' geolocations. Among 1000 simulated tweets, 527 were accurately categorized as not requiring emergency help by the proposed tweet classification technique. Among the remaining 473 tweets, the computer was able to extract tags from 423 tweets asking assistance. Google Maps was also used to gather 407 accurate locations. The geolocations of 16 tweets could not be established due to processing difficulties. This information is beneficial to first responders. To enhance rescue and relief operations and locate the positions of victims more quickly and effectively, a systematic approach to gather data on Twitter was found. The method and demonstration were found to be enhanced further by merging higher-performing models with larger training sets.

The usage of social media, particularly Twitter, has significantly expanded in the recent decade, reflecting people's rising desire to share information, interact, and stay up to speed on current events without leaving the comfort of their homes. With over 18.6 million active users, social media platforms such as Twitter have become the most popular source of information exchange in Türkiye (Oberlo 2023). Despite the fact that the usage of Twitter as a communication tool has grown commonplace, there is a lack of awareness of how this social media is used in crisis settings and what function it plays in rescue and relief activities.

The 6 February Türkiye–Syria earthquake provides a sufficient case study for evaluating the effects Twitter had on the general people as well as the rescue and relief activities within the first 48 h. There have been no direct investigations relating to this exact event due to its unique character and recent occurrence. This study seeks to fill that information vacuum by providing an overview of Twitter use using statistics gathered from Twitter data, recorded interviews, infographics, similar case studies, and the AFAD's official Twitter account.

5.2. Objectives of the Study

This study aims to investigate the positive role of developing the use of Twitter in crisis communication and rescue and relief efforts after the 6 February 2023 earthquake in Türkiye. Some related earthquakes and the use of Twitter during them are discussed and the development of Twitter use in comparison to the last earthquake is commented upon to have a better understanding of Twitter's role in general.

This study also assesses the use of Twitter in the first 48 h following the aforementioned earthquake. The reason for this is that, when a crisis occurs in a location, the same communication standards apply as in normal times, but the response must be well rehearsed and

thoughtful. The first 48 h of a crisis are critical because they decide whether the situation becomes manageable or an uncontrollable tragedy. Because the first two days after a crisis are the most vital, planning is essential to ensuring that the problem is dealt with as quickly and efficiently as possible (Torossian 2015). The idea is that the use of Twitter considerably benefited rescue and relief operations during the critical hours following the earthquake. The aims are to show how:

(1) The development of the use of social media, particularly Twitter, during the most prominent earthquakes that struck Türkiye over the years, has had a positive determinism on communication crises.
(2) The intensity and frequency of tweets over the 24–48 h period, as well as how they vary in terms of content during the length of the crisis.
(3) Twitter has the surveillance function as the primary source of up-to-date information during the earthquake, as well as how it varies from traditional media channels. Thus, Twitter was a dependable source of current information on natural disasters in Türkiye.
(4) Influential accounts had the most influence during the crisis's early hours and how this information was communicated to the wider public.
(5) Twitter assisted in discovering victims and how much the reaction and relief activities depended on this social media to offer useful data about the most affected locations.
(6) Twitter may be used for disaster response tactics, as well as identifying opportunities for future development.
(7) Professionals can depend on Twitter data to gather catastrophe victims' geolocations.

5.3. The Study's Hypotheses

Based on the review of the related literature and studies, and this study's aims, the study hypothesized:

H1. *The positive determinism of the use of Twitter in communication crisis has evolved during the natural crises, and this is shown by the development of its use during the most prominent earthquakes that struck Türkiye over the years.*

H2. *Twitter was crucial for finding casualties, also known as geotagging, as well as being a main source of information and on-the-ground updates during the critical moment, which confirms the media's surveillance function.*

H3. *During the first 48 h of the 2023 earthquake in Türkiye, Twitter had considerable impact on rescue and relief activities. Moreover, it enabled individuals still trapped beneath the debris to contact, seek for, and receive assistance.*

H4. *The importance of social media, especially Twitter, has increased in political communication by opinion leaders and government authorities in the field of media crisis management and calming people during disasters.*

5.4. Methods and Procedures

This study employed a mixed-methods research approach. The three-way method was used in order to gain deeper insights into the state of Twitter.

5.4.1. Secondary Research and Reviewing Available Literature

Prior to beginning the primary study, secondary research was carried out in order to summarize, compile, and/or synthesize earlier studies. Prior to primary research, secondary research is frequently carried out to ascertain what data are not currently available (McCrocklin 2018). To give a broad overview of the body of knowledge on the subject, the different facets of the subject of technological and communication determinism, social media's function in communication and crisis management, the positive role of Twitter in

crisis communication, and the use of Twitter during earthquake disasters generally and in Türkiye specifically are included.

To provide a general image of the existing knowledge on the topic that summarizes the current state of understanding on a topic within the communication science discipline, different aspects of the topic on technological and communication determinism, technological determinism and social media in crisis communication and management, Twitter's positive determinism in crisis communication, and the use of Twitter during earthquake disasters in general and in Türkiye in particular were reviewed.

In addition to secondary research, some similar previous earthquakes in Türkiye were studied in order to highlight the development of media and social media use in crisis communication in the event of earthquakes. The 1999 İzmit (Gölcük) and the 2020 Izmir earthquakes were evaluated and summarized in order to provide the most comprehensive understanding. The parallels and contrasts between the three earthquakes and their relationship to media and social media, particularly Twitter, will allow for comparison and allow the study to investigate the development of Twitter's role in crisis communication in Türkiye.

5.4.2. Critical Textual Analysis

This study analyzed official remarks from the President of Türkiye, Recep Tayyip Erdoğan, in order to acquire insights into the debate of state authorities on Twitter in the first 24–48 h. Smith and Firth (2011) defined the theme analysis as "qualitative analysis that identifies patterns in data, such as commonalities or contrasts." An interpretive process follows a set of stages and yields insights into complicated events. Researchers adopted Creswell's (2011) method of data collection, which is an iterative procedure. According to Creswell, data are initially arranged in open categories and then refined to acquire a theoretical focus. Accordingly, researchers read the texts, such as interview transcripts, several times, assuring comprehension and identifying the main points in each.

This study included gathering the tweets, assessing the emotions as well as the intent behind them, and calculating the time.

5.4.3. Content Analysis

This study also analyzed and determined the context of the conversations on Twitter during the initial 48 h of the 2023 Türkiye–Syria earthquake. What hashtags were used on Twitter and how they related to the key events in the crisis were investigated.

The random sample method was used to analyze data from the collective number of tweets during the first 24–48 h of the earthquake, and extensive research on the topics, keywords, sentiments, and hashtags used in the sample size will be conducted to draw conclusions about the Twitter sphere during the specified time. The free, public-domain Python notebook by Preda (2023) was used.

This study applied the content analysis of the official Twitter account of AFAD following the Türkiye 2023 earthquake. The content analysis serves as an overview of the content of tweets, topics, subtopics, as well as the progression of tweet content during the period shortly after the catastrophe.

A constructed week sample, which is commonly used in studies that analyze textual content from newspapers, online news sources, social media platforms, and other sources, was prepared to create a representative sample of data for analysis. The aim for using this sampling technique was to examine trends, patterns, and changes in the content over time. The period studied was from the first day of the earthquake 6 February 2023 until 26 March 2023, as shown in Table 3, while Table 4 shows the collected tweets during that period.

Table 3. The constructed week sampling applied on the official Twitter account of AFAD.

#	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	6 February 2023						
2		14 February 2023					
3			22 February 2023				
4				2 March 2023			
5					10 March 2023		
6						18 March 2023	
7							26 March 2023

Table 4. The collected tweets from the official Twitter account of AFAD.

Date	Published Tweets
6 February 2023	https://twitter.com/AFADBaskanlik/status/1622413267007143936 https://twitter.com/AFADBaskanlik/status/1622425656821784576 https://twitter.com/AFADBaskanlik/status/1622425658344280065 https://twitter.com/AFADBaskanlik/status/1622425660231663618 https://twitter.com/AFADBaskanlik/status/1622427848664391681 https://twitter.com/AFADBaskanlik/status/1622427850153381890 https://twitter.com/AFADBaskanlik/status/1622431092891328512 https://twitter.com/AFADBaskanlik/status/1622437202721492992 https://twitter.com/AFADBaskanlik/status/1622444124925206528 https://twitter.com/AFADBaskanlik/status/1622452800541048832 https://twitter.com/AFADBaskanlik/status/1622459145193414656 https://twitter.com/AFADBaskanlik/status/1622459146737012736
14 February 2023	https://twitter.com/AFADBaskanlik/status/1625461447428911106 https://twitter.com/AFADBaskanlik/status/1625561253358800909
22 February 2023	https://twitter.com/AFADBaskanlik/status/1628388726417104896
2 March 2023	https://twitter.com/AFADBaskanlik/status/1631212753082892291 https://twitter.com/AFADBaskanlik/status/1631266392669339650 https://twitter.com/AFADBaskanlik/status/1631342645858508801 https://twitter.com/AFADBaskanlik/status/1631342647813054480 https://twitter.com/AFADBaskanlik/status/1631342649746546688 https://twitter.com/AFADBaskanlik/status/1631342651789246464 https://twitter.com/AFADBaskanlik/status/1631342653714440206 https://twitter.com/AFADBaskanlik/status/1631342657640308743 https://twitter.com/AFADBaskanlik/status/1631342659661963277
10 March 2023	https://twitter.com/AFADBaskanlik/status/1634029304932597767 https://twitter.com/AFADBaskanlik/status/1634139775346040833 https://twitter.com/AFADBaskanlik/status/1634178216079360003 https://twitter.com/AFADBaskanlik/status/1634178218604232704 https://twitter.com/AFADBaskanlik/status/1634213580454109184
18 March 2023	https://twitter.com/AFADBaskanlik/status/1637025213727555584 https://twitter.com/AFADBaskanlik/status/1637091327815942149 https://twitter.com/AFADBaskanlik/status/1637091330856742914 https://twitter.com/AFADBaskanlik/status/1637187149064818694 https://twitter.com/AFADBaskanlik/status/1637187473024376833
26 March 2023	https://twitter.com/AFADBaskanlik/status/1639953152156786689 https://twitter.com/AFADBaskanlik/status/1640052276554342404

5.4.4. Utilizing Artificial Intelligence in Gathering Data from Twitter

This study was made possible with the usage of artificial intelligence, specifically GPT-3 with a web access plugin.

AI plays a big and diverse role in gathering data from Twitter for crisis communication. The powers of AI are revolutionizing the way in which social media is used during crises, allowing companies to respond to crucial events more efficiently, effectively, and empathetically. During a crisis, AI-powered technologies are used to evaluate massive volumes of data collected on social media sites such as Twitter. These systems can rapidly scan and interpret real-time data, offering useful insights and trends that assist crisis communication teams in understanding the severity and effect of the issue (Darbinyan 2023). Héder (2021) examines how AI may affect the idea of technological determinism. It examines the relationship between AI regulation and the idea of the social control of technology, making the case that the degree of regulatory activity may be a good indicator of technology's potential for lock-in, which has an impact on technological determinism. The digital nature of computers, particularly AI, intensifies this lock-in risk due to the ease of multiplication and reuse. The report also highlights the unique property of AI, which adds to this phenomenon, that it is both software and an autonomous agent at the same time. This study provides a new understanding of technological determinism in light of the growing influence of AI and its implications for social and scientific research.

The GPT-3 was used as the AI due to its immense presence and popularity, generating over 100 million users (Milmo 2023). Artificial intelligence was used in order to process the data collected from Twitter, as well as systematically analyze it.

According to researchers from Damo Academy, the in-house research arm of the Chinese e-commerce giant Alibaba Group Holding, and Singapore's Nanyang Technological University, the use of AI in data analysis has proven to be faster and cheaper than a human data analyst (Deng 2023). Additionally, the AI has proven to provide comparable performance as a senior analyst, working in a much shorter time span and generating results that are more complex. The research concluded that despite the errors, GPT-3 could generate correct analysis.

According to the study performed on GPT and academic research (Rahman et al. 2023), the AI is able to provide decent output for qualitative data analysis if researchers provide all necessary information regarding the research methods utilizing an advanced prompt. Additionally, since the researchers cannot upload direct databases to GPT, the empirical analysis can be performed by transcribing the data, which provides good results (Rahman et al. 2023).

After the overview of the study performed on AI, it was utilized along with the human control of the results in order to ensure suitable results. The data research performed in this study was performed in cooperation between AI and human control, where AI was primarily used as a supporting tool or an assistant that improved efficiency and allowed for faster results. The results were manually reviewed after the AI output in order to ensure accurate results.

The usage of AI in this study can be seen as beneficial in two ways: firstly, it can provide a comprehensive overview of how artificial intelligence can be used for data research, the benefits, and the ways it can be correctly utilized as an e-assistant. Secondly, it can be used as a stepping-stone in advancing research for the future, serving as an existing body of knowledge that can aid future research on similar content. Additionally, by utilizing AI, this research has opened the way for small-scale research, such as student research, to reach new possibilities and make advancements in data collection in a faster, more efficient manner, and with more resources on hand. Ultimately, as highlighted by this research, the AI technology has made it possible to review large quantities of data and provide suitable outputs that, after being manually reviewed, accurate and fast results were provided. Moreover, the usage of AI has added another work force in the form of an e-assistant, which allowed for more in-depth analysis and faster result processing.

The progress of the tweets, their intensity, and their content were searched. In order to analyze the content of the tweets and the content evolution of the tweets given in the table above, the following procedures were followed:

(1) Data were collected using advanced Twitter search, selecting the data range from 6 February until 26 March 2023.
(2) The data were manually collected.
(3) AI technology with the Python extension was utilized to allow the AI to access the database of tweets, and then these were categorized depending on the topics, subtopics, dates, themes, and content types.
(4) Information was collected and the data were formatted into tables for easier reading.

6. Findings and Results

6.1. Findings on the Use of Twitter in Previous Earthquakes in Türkiye

The 1999 Izmit (Gölcük) Earthquake: According to Tekeli-Yesil et al. (2019), print and broadcast media, for example, played an important role in distributing information during and after the 1999 Izmit Earthquake. They offered status updates, such as the magnitude of the disaster, rescue and relief activities, and safety recommendations. Media outlets have a large audience and may help raise public awareness, facilitate cooperation among authorities, and mobilize resources for emergency and recovery activities.

Traditional media dominated coverage of the Marmara earthquake because Twitter did not exist in 1999 and only started operating in 2006. The usage of conventional media channels like newspapers, radio, and television, which had a more dominating role owing to their extensive reach and acted as a primary source of information throughout the post-disaster era, may be used to understand the function of media during this earthquake. To get the most recent information, people have to rely on conventional media sources. Due to the relatively low use in 1999, online conversations had little to no influence. The media was crucial in providing information, increasing awareness, and organizing relief activities after the 1999 İzmit earthquake.

Their coverage helped to organize relief, facilitate rescue operations, and aid in the healing process. However, according to other investigations, such as the one by Şahinsoy (2017), a certain group of people or organizations controlled traditional media. This has the potential to spread incorrect information. For instance, speculation persisted that the true death toll from the Marmara earthquake was not made public for a very long period of time. One of the main drawbacks of traditional media is this. The ethically delicate nature of the news, as well as the individual rights of those involved, such as the right to privacy and the protection of personal data after emergencies or disasters, can be ignored when creating news content for traditional and social media. This makes disaster management more difficult (Ertuğrul and Yükseler 2021).

The 2020 Izmir Earthquake: According Ağrali et al. (2022), during the 2020 Izmir Earthquake, social media, specifically Twitter, were utilized in ways to search for aid, follow up with the events in the aftermath, and express grief and good wishes to those affected. The use of Twitter during that period mostly relied on offering aid through hashtags and trending topics. Based on the analysis performed by Ağrali et al. (2022), There were over 250 thousand shares of the hashtag "*#deprem*," which is followed by "*#izmirdepremi*" and "*#izmirdeprem*." Additionally, users posted pictures and videos, adding to the collective body of information while expressing support and solidarity through the *#geçmişolsun* hashtag (Ağrali et al. 2022). The rapid use of Twitter during the crucial crisis period aided in engaging the community to support, help, and mobilize resources in order to reach those in need. As a result, the use of social media during the 2020 Izmir earthquake was beneficial in the sense that it allowed government officials and aid organizations to respond to the crisis in a more systematic manner (Ağrali et al. 2022). Table 5 summarizes the main points of the use of Twitter in the two previous earthquakes.

Table 5. The most crucial points of the analysis regarding the use of Twitter during the above-mentioned earthquakes.

Earthquake	Year	Location	Use of Media and Social Media
Izmit Earthquake	1999	Izmit, (Gölcük) Türkiye	- Social media were not established during this earthquake; however, other types of communication were utilized.
			- Traditional media outlets such as television, radio, and newspapers played a significant role in informing the general public and sharing relevant information.
			- General public used emails, early versions of instant messaging such as Internet discussion boards and chat rooms as well as an early version of web portals in order to share and communicate their opinion and relevant information.
Izmir Earthquake	2020	Izmir, Türkiye	- Utilized social media particularly Twitter, for searching aid, following up with events, expressing grief, and offering support.
			- Hashtags like "#*deprem*", "#*izmirdepremi*", and "#*izmirdeprem*" were used to offer aid and share information.
			- Users posted pictures and videos, contributing to the collective body of information and expressing solidarity through the "#*geçmişolsun*" hashtag.
			- Social media engagement aided in mobilizing resources, supporting affected individuals, and allowing systematic response from government officials and aid organizations.

6.2. Findings of Critical Text Analysis

An advanced Twitter search was utilized to gain the data and links to the tweets from the President of Türkiye, Recep Tayyip Erdoğan (*@RTErdogan*), ranging from 6th of February to 7th of February during the crisis period. In order to systematically categorize the data, an AI powered language model, which was trained on the language model, was used in order to analyze the content. The dates, links to the tweet, and content were provided, and the AI was instructed to analyze the sentiments, which encompass the notion, attitude, or belief based on how one feels about the circumstance or how one sees it, taking into an account the identified keywords shown in Table 6.

Table 6. The tweets of the president of Türkiye, Recep Tayyip Erdoğan (*@RTErdogan*), from 6th of February to 7th of February.

Date	Keyword	Content	Tweet Link	Sentiment
6 February 2023	Earthquake	Coordinating post-earthquake efforts. Hope to overcome the disaster quickly and with minimal damage.	Tweet Link 1	Neutral
6 February 2023	Search and Rescue	Search and rescue teams dispatched to affected regions. Government institutions actively involved.	Tweet Link 2	Positive
6 February 2023	Well Wishes	Extending well wishes to affected citizens in Kahramanmaraş. Relevant units on alert under AFAD.	Tweet Link 3	Positive
6 February 2023	AFAD	A press release from AFAD (Disaster and Emergency Management Authority).	Tweet Link 4	Neutral
6 February 2023	Unity and Solidarity	Expressing unity and solidarity as a nation to overcome the current challenging days.	Tweet Link 5	Positive
6 February 2023	International Aid	Initiation of contacts with other countries for international aid. Offers received from NATO, European Union, and 45 other countries.	Tweet Link 6	Positive
6 February 2023	State Action	Activation of all government institutions immediately after the earthquake. Local administrations mobilized resources. Additional governors assigned.	Tweet Link 7	Positive
6 February 2023	National Mourning	Declaration of a seven-day national mourning period. Lowering of flags across the country and at diplomatic missions until sunset on 12 February 2023.	Tweet Link 8	Neutral

Table 6. *Cont.*

Date	Keyword	Content	Tweet Link	Sentiment
7 February 2023	Information Center	A press release from the State Information Coordination Center.	Tweet Link 9	Neutral
7 February 2023	Extraordinary Measures	Announcement of declaring the 10 affected provinces as a disaster zone. Declaring a state of emergency (Olağanüstü Hal) for three months in those provinces.	Tweet Link 10	Negative

Tweet Link 1: https://twitter.com/RTErdogan/status/1622549953083056128?ref_src=twsrc%5Etfw; Tweet Link 2: https://twitter.com/RTErdogan/status/1622549873642856448?ref_src=twsrc%5Etfw; Tweet Link 3: https://twitter.com/RTErdogan/status/1622549183549919235?ref_src=twsrc%5Etfw; Tweet Link 4: https://twitter.com/RTErdogan/status/1622536820482314240?ref_src=twsrc%5Etfw; Tweet Link 5: https://twitter.com/RTErdogan/status/1622549953083056128?ref_src=twsrc%5Etfw; Tweet Link 6: https://twitter.com/RTErdogan/status/1622549873642856448?ref_src=twsrc%5Etfw; Tweet Link 7: https://twitter.com/RTErdogan/status/1622549183549919235?ref_src=twsrc%5Etfw; Tweet Link 8: https://twitter.com/RTErdogan/status/1622650586607808512?ref_src=twsrc%5Etfw; Tweet Link 9: https://twitter.com/RTErdogan/status/1622923263616720897?ref_src=twsrc%5Etfw; Tweet Link 10: https://twitter.com/RTErdogan/status/1622549873642856448?ref_src=twsrc%5Etfw.

6.3. Findings of Twitter Content Analysis

By analyzing data collected from Twitter, we can understand the tweet flow within the first 48 h. In order to gain the data, as we were unable to directly gain access to a Twitter API key, this study relied on using Preda's (2023) collected exploratory data analysis (EDA) Python notebook, which contains all the metadata following the Türkiye earthquake. Excel's built-in filter system was used to systemize the data and only count the first 48 h. After that, the random sampling was performed in order to obtain a smaller number of tweets for an in-depth analysis. As shown in Table 7, a number of 30 tweets were decided to be used as a sample for the analysis.

Table 7. Random sample of 30 tweets.

#	Date Time	Text	Hashtags
1	6 February 2023 19:57:03 + 00:00	*It's horrible! #People urgently need #CreativeSociety-where the value of #life comes first. #Turkey...*	*['People', 'CreativeSociety', 'life', 'Turkey', 'Syria']*
2	6 February 2023 19:14:54 + 00:00	*People in Turkey are in immediate need of help due to the devastating earthquake After 2 major earth...*	*['Turkey', 'TurkeyQuake']*
3	6 February 2023 12:46:32 + 00:00	*We're in trouble. Please support Turkey. Send your help* via *@ahbap and @AFADBaskanlik #Turkey #Turke...*	*['Turkey', 'TurkeyQuake']*
4	6 February 2023 11:49:05 + 00:00	*Get well soon: Turkey NFT SALE ONLINE #turkey #kahramanmaraş #deprem #tiürkiye #afad #earthquake #ea...*	*['turkey', 'kahramanmaraş', 'deprem', 'türkiye', 'afad', 'earthquake', 'earthquaketurkey']*
5	6 February 2023 07:02:03 + 00:00	*Prey For Turkiens* 💔💔 *#TurkeyEarthquake #earthquake #Turkey #earthquaketurkey #Syria #syriaearthqu...*	*['TurkeyEarthquake', 'earthquake', 'Turkey', 'earthquaketurkey', 'Syria', 'syriaearthquake', 'Turkey...*
6	7 February 2023 01:02:06 + 00:00	*Death toll from Turkey-Syria earthquake surpasses 20,500 https://t.co/ffJlkJSYSQ #LatestNews #Syria...*	*['LatestNews', 'Syria', 'TurkeyEarthquake']*
7	7 February 2023 01:01:47 + 00:00	*Generational trauma is in a mother's milk and DNA. Ask a #circassian how many genocides, exiles, dis...*	*['circassian']*
8	7 February 2023 23:27:05	*#OperationDost: Indian Army in Turkey. #Turkey #TurkeyEarthquake #earthquake https://t.co/FcEY4u5rZ...*	*['OperationDost', 'Turkey', 'TurkeyEarthquake', 'earthquake']*
9	7 February 2023 23:27:10	*#OperationDost: Hospital setup by the Indian Army for treatment of victims in Turkey #Turkey #Turke...*	*['OperationDost', 'Turkey', 'TurkeyEarthquake']*
10	7 February 2023 23:27:11	*For Syrians devastated by civil war, the earthquake aftermath is 'a crisis in a crisis' https://t.co...*	
11	7 February 2023 23:29:29	*#Earthquake is a natural disaster not letting help get to #Syrians in Northern Syria is a crime agai...*	*['Earthquake', 'Syrians']*

Table 7. *Cont.*

#	Date Time	Text	Hashtags
12	7 February 2023 23:30:00	*Over 5000 people were confirmed dead on Tuesday after an earthquake and after-shocks hit Turkey, Sy...*	
13	7 February 2023 23:30:10	*To disable two-factor authentication for any account, send a dm right away. #logins #2fa #twofactor...*	*['logins', '2fa', 'twofactorauthentication']*
14	7 February 2023 23:32:56	*Such an incredible, unbelievable loss, 21,000 dead. #TurkeyEarthquake*	*['TurkeyEarthquake']*
15	7 February 2023 23:40:35	*Global EXOL! As you all know, an earthquake occurred in Turkey. This is a big earthquake that killed...*	
16	7 February 2023 23:23:07	*Learning how to manage your actions during a natural disaster can save you and those around you. #na...*	*['natural', 'disaster']*
17	7 February 2023 23:21:54	*!!!!GLOBAL ARMYS WE NEED YOUR HELP!!!!!!!!!! #TurkeyHelp #TurkeyEarthquake #PrayForTurkey #BTSAR...*	*['TurkeyHelp', 'TurkeyEarthquake', 'PrayForTurkey', 'BTSARMY', 'BTS']*
18	7 February 2023 23:21:37	*!!!!GLOBAL ARMYS WE NEED YOUR HELP!!!!!!!!!!!!!! #TurkeyHelp #TurkeyEarthquake #PrayForTurkey #B...*	*['TurkeyHelp', 'TurkeyEarthquake', 'PrayForTurkey', 'BTSARMY', 'BTS']*
19	7 February 2023 23:21:24	*!!!!GLOBAL ARMYS WE NEED YOUR HELP!!!!!!!!!!!! #TurkeyHelp #TurkeyEarthquake #PrayForTurkey #BTS...*	*['TurkeyHelp', 'TurkeyEarthquake', 'PrayForTurkey', 'BTSARMY', 'BTS']*
20	8 February 2023 17:41:13	*#TurkeyEarthquake IL Israeli Embassy: 17 people were rescued from the rubble by Israeli teams...*	*['TurkeyEarthquake']*
21	8 February 2023 17:41:11	*We still begging on people to help Donate for the family who have lost their homes we saying that ev...*	
22	8 February 2023 17:41:00	*Blessed Nikas family Father Panagiotis saved 11yrs Andreas in Aigion june95 He protects his son Kost...*	
23	8 February 2023 17:39:25	*We need help TR #earthquakeinturkey #TurkeySyriaEarthquake #TurkeyEarthquake #HelpTurkey #HelpTur...*	*['earthquakeinturkey', 'TurkeySyriaEarthquake', 'TurkeyEarthquake', 'HelpTurkey', 'Help*
24	7 February 2023 17:29:18	LRI@TMobile PDI Responds to Earthquake in Turkey and Syria with 1-week free calls offer. LRI@Verizon...	
25	7 February 2023 17:28:44	*"Paint me the picture of sadness" A father carrying the body of his son in* TR *Turkey after the e...*	
26	7 February 2023 17:28:30	*Pray for turkey* TR *#TurkeyEarthquake #turkey #แผ่นดินไหวตุรกี #แผ่นดินไหวตุรกี*	*['TurkeyEarthquake', 'turkey', 'แผ่นดินไหวตุรกี', 'แผ่นดินไหวตุรกี']*
27	7 February 2023 17:28:10	*India with turkey #TurkeyEarthquake https://t.co/CEqxbHkm9c*	*['TurkeyEarthquake']*
28	7 February 2023 17:27:28	*Pls donate even a lil bit to the reliable non-governmental organization below n help us heal our wou...*	
29	6 February 2023 17:27:27	*@dharmvir_9 @DamodarHegde4 @sureshseshadri1 @GSNarayan1960 @apurvaparikh18 @Am_dilip @Bharatwashi2 @...*	
30	7 February 2023 17:26:20	*@CMShehbaz Shehbaz Sharif is turning #TurkeyEarthquake into a personal PR exercise... Shameful... htt...*	*['TurkeyEarthquake']*

After the data collection topic, modeling was performed in order to identify crucial topics and sort them into three identifiable categories as shown in Table 8. The representative tweets were extracted for a better understanding of the results, offering a direct insight in the actual tweet format and topic.

Table 8. The categorization of the previously collected tweets.

Topic	Title	Keywords	Representative Tweets	Number of Tweets	Hashtags	Example Tweet
1	Call for Help and Support	help, support, need, donate, victims, treatment, hospital, organization	*- "People in Turkey are in immediate need of help due to the devastating earthquake." - "Please support Turkey. Send your help* via *@ahbap and @AFADBaskanlik." - "Pls donate even a lil bit to the reliable non-governmental organization below and help us heal our wounds."*	13	*TurkeyHelp, TurkeyEarthquake, PrayForTurkey, OperationDost, TurkeyQuake, earthquake, Turkey, Turke, 2fa, twofactorauthentication*	
2	Impact and Loss Assessment	earthquake, devastation, death toll, loss, casualties, aftermath	*- "It's horrible! People urgently need a Creative Society-where the value of life comes first." - "Death toll from Turkey-Syria earthquake surpasses 20,500." - "Such an incredible, unbelievable loss, 21,000 dead."*	7	*TurkeyEarthquake, LatestNews, Syria, TurkeyEarthquake, turk, earthquake, türkiye, afad, earthqaketurkey*	
3	Crisis in Türkiye and Syria	Türkiye, Syria, Turkish, crisis, Syrian, Northern Syria	*- "We're in trouble. Please support Turkey." - "For Syrians devastated by civil war, the earthquake aftermath is 'a crisis in a crisis'." - "India with Turkey."*	10	*Turkey, Syria, Turkish, crisis, Syrian, Northern Syria, TurkeyEarthquake, earthquake, Earthquake, Syrians, logins, 2fa, twofactorauthentication, TurkeyQuake*	

As shown in Figure 1, the keywords found match the word clouds run by Preda (2023) in his Python notebook.

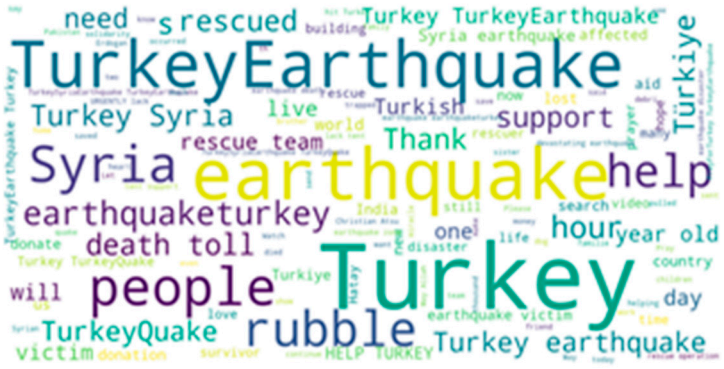

Figure 1. Türkiye earthquake tweets. Source: This figure was retrieved from the following site: https://www.kaggle.com/code/gpreda/turkey-earthquake-tweets-an-eda (accessed on 15 May 2023), which is a part of the bigger Python notebook, by Gabriel Preda 2023.

The results were visualized in a graph using Python. The OpenAI was prompted to develop a code using Python's matplotlib library, which then was run through Replit.com in order to run the process of creating a graph. After Replit.com ran the code, this graph was given as a repetition of the results. The code that ran in Python is shown in Figure 2.

```
1  import matplotlib.pyplot as plt
2
3  # Data for the graph
4  topics = ['Call for Help and Support', 'Impact and Loss
   Assessment', 'Crisis in Turkey and Syria']
5  tweet_counts = [16, 9, 15]
6
7  # Create a bar graph
8  plt.bar(topics, tweet_counts)
9  plt.xlabel('Topics')
10 plt.ylabel('Number of Tweets')
11 plt.title('Tweet Distribution by Topic')
12
13 # Display the graph
14 plt.show()
15
```

```
Replit: Updating package configuration

--> poetry add matplotlib
Using version ^3.7.1 for matplotlib

Updating dependencies
Resolving dependencies...

Writing lock file

Package operations: 7 installs, 1 update, 0 removals

  • Updating pytoolconfig (1.2.4 -> 1.2.5)
  • Installing contourpy (1.0.7)
  • Installing cycler (0.11.0)
  • Installing fonttools (4.39.4)
  • Installing kiwisolver (1.4.4)
  • Installing pillow (9.5.0)
  • Installing python-dateutil (2.8.2)
```

Figure 2. The code that ran in Python.

The three main topics circulated in Twitter during the first 24/48 h after the catastrophe from the 30-tweet sample were: Call for Help and Support—43.33%; Impact and Loss Assessment—23.33%; and Crisis in Türkiye and Syria—33.33%, as shown in Figure 3.

After manually selecting the content using the advanced Twitter search, artificial intelligence (AI) in combination with Python programming language were utilized. During the study, Panda (Python library) was used and the data were prepared and collected. After the integration of the tweets, the OpenAI machine learning technology was implemented to assist in gaining information such as language processing and machine learning. In order to achieve appropriate results, certain input criteria and explanations were provided, such as content type, time, source, hashtags, topics and sub-issues, and themes and issues in order to train the AI to recognize the patterns between these categories from the Tweets provided. After training, the certain adjustments were made to the AI since the AI recognized certain tweets as not being from the same category such as "Announcement" "Announcement/Update" and "Official Announcement". The AI was prompted to fix and recalculate which gave suitable results. By using the automated process, a large number of Tweets from the AFAD's official Twitter account were sorted through. After obtaining the data, the AI was prompted to format it in, as shown in Table 9.

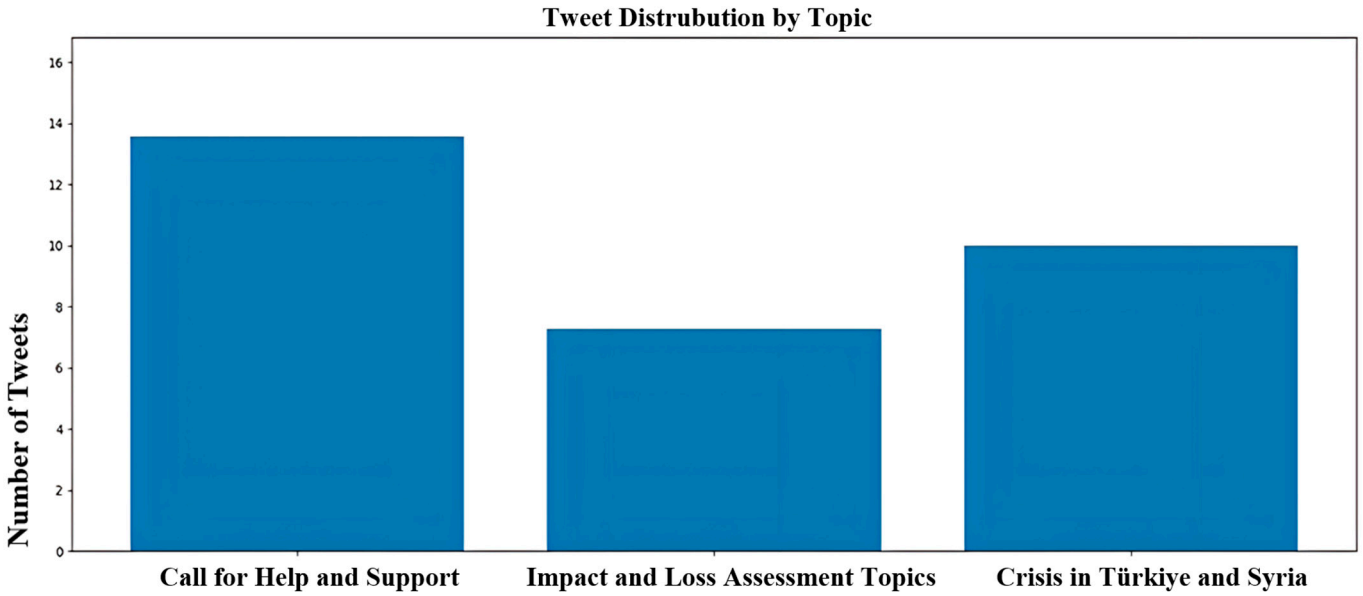

Figure 3. The three main topics circulated in from the 30-tweet sample during the first 24/48 h after the earthquake.

Table 9. The themes, issues, and hashtags from AFAD's official Twitter account during the mentioned period.

Content Type	Time	Source	Hashtags	Topics and Sub-Issues	Themes and Issues
			6 February 2023		
Informational tweet	6 February 2023	@AFADBaskanlik	*#DEPREM*	Natural disaster, earthquake, location (Kahramanmaraş, Pazarcık), updates	Crisis management, emergency response, public safety
Image	6 February 2023	@AFADBaskanlik	*#deprem*	Earthquake in Kahramanmaraş, Pazarcık district, magnitude 7.4, impact on neighboring provinces (Kahramanmaraş, Hatay, Adana, Osmaniye, Diyarbakır, Malatya, and Şanlıurfa)	Natural disasters, emergency response, public safety
Informational tweet	6 February 2023	@AFADBaskanlik	Not Available	Earthquake, disaster response, Türkiye, earthquake magnitude, disaster management, emergency response	Natural disasters, emergency management
Update tweet about the earthquake response	6 February 2023	@AFADBaskanlik	Not Available	Earthquake response, search and rescue, emergency management	Natural disasters, emergency preparedness
Warning	6 February 2023	@AFADBaskanlik	Not Available	Importance of communication in emergencies	Emergency communication
Informational tweet	6 February 2023	@AFADBaskanlik	Not Available	Emergency communication, phone calls, time management, importance of uninterrupted communication during emergencies, use of SMS and Internet messaging	Emergency response, disaster management
Informational tweet	6 February 2023	@AFADBaskanlik	Not Available	Earthquake, safety precautions, emergency communication, entering damaged buildings, clearing roads for emergency vehicles	Emergency response, public safety

Table 9. *Cont.*

Content Type	Time	Source	Hashtags	Topics and Sub-Issues	Themes and Issues
Official statement	6 February 2023	@AFADBaskanlik	*#deprem*	Natural disasters, earthquake	Emergency management, public safety
Informational tweet	6 February 2023	@AFADBaskanlik	*#deprem*	Emergency communication	Natural disasters
Informational tweet	6 February 2023	@AFADBaskanlik	Not Available	Disinformation	Crisis management
Official statement from the AFAD	6 February 2023	@AFADBaskanlik	*#deprem*	Aftermath of earthquake, seismic activity, emergency response	Natural disasters, emergency management, public safety
Disaster announcement	6 February 2023	@AFADBaskanlik	Not Available	Earthquake, casualties, fatalities, injuries, disaster relief	Natural disaster, emergency response, public safety
			14 February 2023		
Press release	14 February 2023	@AFADBaskanlik	Not Available	Earthquakes, Kahramanmaraş	Natural disasters, emergency management
Image	14 February 2023	@AFADBaskanlik	Not Available	Disaster response	Natural disasters, earthquakes
			2 March 2023		
Announcement/statement	2 March 2023	@AFADBaskanlik	Not Available	Disaster response, collaboration, solidarity, emergency management, disaster relief, community engagement, volunteerism, disaster recovery	Natural disasters, humanitarian aid, national unity, community resilience, crisis management, public participation
Humanitarian	2 March 2023	@AFADBaskanlik	Not Available	Animal welfare, disaster relief	Natural disasters, animals
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Earthquake relief, emergency housing, disaster management, earthquake impact, temporary shelter, assistance to victims	Natural disasters, emergency response, humanitarian aid
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Earthquake, disaster response, shelter	Natural disasters, emergency response, humanitarian aid
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Earthquake response and relief efforts,	Disaster management, emergency response, temporary housing, sanitation facilities
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Earthquake response efforts, search and rescue personnel, heavy machinery, aircraft	Disaster management, emergency response
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Mobile kitchens, food aid, emergency services, humanitarian aid	Natural disasters
Informational tweet	2 March 2023	@AFADBaskanlik	Not Available	Earthquake relief, financial assistance	Natural disasters, government response, financial support
Tweet (statement)	2 March 2023	@AFADBaskanlik	Not Available	Disaster relief, volunteerism	Humanitarian aid, disaster relief

Table 9. *Cont.*

Content Type	Time	Source	Hashtags	Topics and Sub-Issues	Themes and Issues
			10 March 2023		
Announcement tweet	10 March 2023	@AFADBaskanlik	*#deprem*	Earthquake, disaster response, aftershock, Hacılar district, Kayseri, Türkiye	Emergency management, public safety
Announcement/update	10 March 2023	@AFADBaskanlik	*#AFAD*	Earthquake, rural housing, permanent housing, location selection, disaster relief	Natural disaster response, housing reconstruction
Weather forecast announcement	10 March 2023	@AFADBaskanlik	Not Available	Weather conditions, wind speed and direction	Natural disaster preparedness and response, public safety
Informational tweet	10 March 2023	@AFADBaskanlik	Not Available	Safety measures for transportation, carbon monoxide poisoning, damages from natural disasters	Public safety, disaster response
Announcement	10 March 2023	@AFADBaskanlik	Not Available	Earthquake, landslides, evacuation, risk assessment	Disaster response and management, public safety
			18 March 2023		
Tweet	18 March 2023	@AFADBaskanlik	*#18MartÇanakkaleZaferi*	Tribute to Mustafa Kemal Atatürk and his comrades	Patriotism, nationalism, historical events, war
Weather update	18 March 2023	@AFADBaskanlik	Not Available	Weather, rain, thunderstorm	Natural disasters, emergency response
Warning tweet	18 March 2023	@AFADBaskanlik	Not Available	Disaster relief, earthquake, emergency response, shelter, infrastructure, logistics	Disaster management, public safety, government response
Relief and update tweet	18 March 2023	@AFADBaskanlik	Not Available	Natural disasters, safety measures, floods, flood damage, transportation disruptions, lightning, hail	Disaster preparedness
Update tweet	18 March 2023	@AFADBaskanlik	Not Available	Disaster management, collaboration, production, earthquake relief, container production	Disaster relief, public support, community partnership
			26 March 2023		
Announcement	26 March 2023	(@AFADBaskanlik)	Not Available	Disaster relief, container city installation, rehabilitation	Disaster relief, community support, rehabilitation
Announcement	26 March 2023	(@AFADBaskanlik)	Not Available	Disaster relief, container city installation, rehabilitation	Disaster relief, community support, rehabilitation

As observed through the data collection, the missing hashtags generally had three major reasons:

(1) The tweet did not include new earthquake information, hence the need for the hashtags was not present in order to avoid over-usage and spam (e.g., update tweets about the progress of rehabilitation, informational tweets for disaster control, advice for safety measurements, etc.).
(2) The tweet was directly responding to the existent tweet from the same account which already added the hashtag or has retweeted the content with the hashtag.
(3) The tweet's content was not about the earthquake (e.g., tribute tweets, weather forecast)

Topic modeling was performed by the use of the latent Dirichlet allocation (LDA) algorithm, AI was instructed to identify the content type, and the count based on the previous database was provided and run through the LDA algorithm, removing punc-

tuations, repeated words, as well as typos in the provided material. Additionally, the algorithm removes numbers and looks for pattern in word choices and attempts to sort them into their respective categories. The OpenAI integration assisted in this, allowing for in-depth topic probability calculations based on the representative words such as disaster, earthquake, and emergency. After running the algorithm, the AI was instructed to format it into Table 10 below.

Table 10. The content types and their characteristics.

Content Type	Explanation	Keywords
Announcements	This type of tweets includes new updates, verified information, and new statics about the earthquake situation. Additionally, they contain updates about recovery, disaster assessment, and community engagement.	Earthquake, aftermath, seismic activity, emergency response, disaster response, collaboration, solidarity, emergency management, disaster relief, community engagement, volunteerism, disaster recovery
Informational tweets	This type of tweet contains advice and instructions to the general public about the earthquake crisis, how to prepare, seek help, and use communication services in the most effective way.	Earthquake, response, relief efforts, impact, magnitude, provinces, communication, phone calls, time management, SMS, Internet messaging, search and rescue
Image	This type of tweets contains an image or a graphics.	Earthquake, magnitude, impact, provinces
Warning	This type of tweet highlights the importance of adhering to guidelines suggested by AFAD.	Importance of communication in emergencies
Official statement	This type of tweet contains the official statements from AFAD or the presidency regarding the situation. This can range from statements about the statistics or statements about national emergency.	Earthquake
Disaster announcement	This type of tweet contains the official announcements regarding the people affected, the growing number of fatalities or injuries, as well as infrastructural damage.	Earthquake, casualties, fatalities, injuries, disaster relief
Press release	This type of tweets contains the statements from AFAD delivered to the news agencies for public release.	Earthquakes, Kahramanmaraş
Humanitarian tweets	This type of tweet contains information about humanitarian actions in the affected regions.	Animal welfare, disaster relief
Weather forecast announcement	This type of tweet contains the updated information about the weather conditions as well as giving warnings for upcoming rainstorms and winds.	Weather conditions, wind speed and direction
Tribute	This type of tweet contains information about the historical events and gives proper acknowledgments.	Mustafa Kemal Atatürk, comrades, patriotism, nationalism, historical events, war

The results show that most tweets are from the categories "informational" and "announcements". The percentages of the results are as follows and visualized in Figure 4.

- Informational tweets—40%;
- Announcements—28.57%;
- Disaster announcement—5.71%;
- Weather forecast announcement—5.71%;
- Image—5.71%;
- Warning—2.86%;
- Official statement—2.86%;
- Humanitarian—2.86%;
- Press release—2.86%.
- Tribute—2.86%;

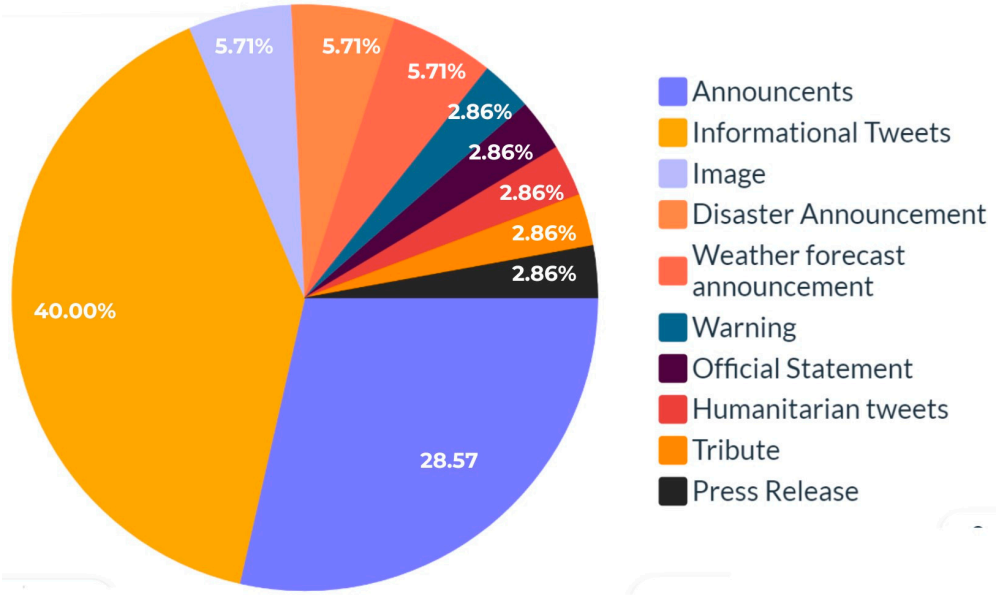

Figure 4. Content type.

After receiving the results, topic modeling was again utilized in order to gain the most used keywords, as shown below in Table 11, in order to obtain a better understanding of the content progression during the first 24–48 h of the disaster. The keyword extraction will allow for a deeper analysis of the subject.

Table 11. The most used keywords.

Keywords
Earthquake
Response
Relief efforts
Magnitude
Provinces
Emergency
Management
Disaster
Communication
Informational
Tweet
Impact
Community
Volunteerism
Recovery
Housing
Collaboration
Solidarity
Engagement

The percentages of the keywords are as follows and visualized in Figure 5.

- Earthquake: 14.16%
- Response: 14.16%
- Relief efforts: 9.3%
- Magnitude: 5.66%
- Provinces: 5.66%
- Emergency: 5.66%
- Management: 5.66%
- Disaster: 5.66%
- Communication: 3.77%
- Informational: 3.77%
- Tweet: 3.77%
- Impact: 2.83%
- Community: 2.83%
- Volunteerism: 2.83%
- Recovery: 2.83%
- Housing: 2.83%
- Collaboration: 2.83%
- Solidarity: 2.83%
- Engagement: 2.83%

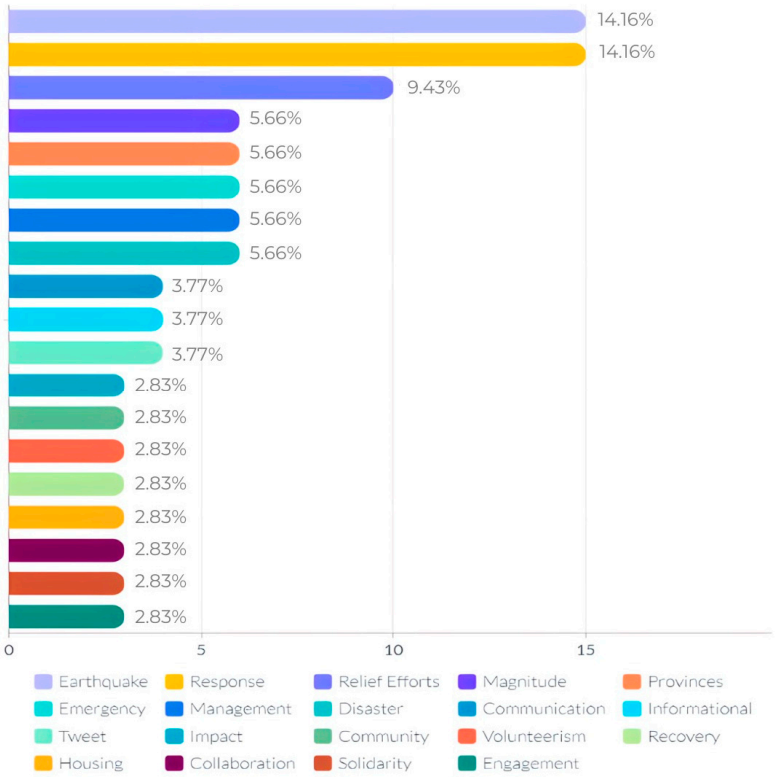

Figure 5. The percentages of the results.

7. Discussion of the Results

The analysis of the findings from the previous cases of the 1999 Izmit and 2000 Izmir earthquakes shows a gradual increase in overall Twitter usage as the years progress. The 1999 Izmit earthquake was the one with no Twitter use, which is normal since social media such as Facebook and Twitter were founded in 2004 and 2006, respectively.

Furthermore, the use of social media was not present due to the technological limitations at the time as well as the general tendency of masses to follow traditional media for gaining information. The social interactions on the Internet were severely limited and had little to no impact since Twitter became operational in 2006 and was not in the period of the

1999 Marmara earthquake (Şahinsoy 2017). The role of the traditional media during this earthquake was crucial in disseminating information, raising awareness, and coordinating relief efforts.

The media, including television, radio, and newspapers, provided real-time updates about the earthquake, its magnitude, and affected areas. They relayed important information about emergency contact numbers, evacuation procedures, and safety precautions to the public. Moreover, media outlets extensively covered the earthquake, highlighting the scale of the disaster, the number of casualties, and the widespread destruction. This helped raise national and international awareness about the earthquake and its impact.

Media coverage of the İzmit earthquake generated public sympathy and support. The images and stories shared by the media prompted an outpour of assistance from within Türkiye and around the world. This support included financial aid, medical supplies, and search-and-rescue teams. In the aftermath of the earthquake, the media focused on educating the public about earthquake preparedness, building codes, and safety measures. They conducted interviews with experts, disseminated information about earthquake-resistant construction techniques, and raised awareness about the importance of emergency drills and evacuation plans.

Later, the use of social media in Türkiye has significantly increased throughout the years. Turkish Internet users became social media platform users for a variety of reasons, including communication, content sharing, and staying up to current on news and events. Twitter's penetration in Türkiye has been continuously expanding, and it has become a crucial element of people's everyday life (Dogramaci and Radcliffe 2015; Dierks 2023).

Comparing to 2020 Izmir earthquake in Türkiye, media including social media had a greater role. The information discussed before suggests that, during the 2020 Izmir earthquake, Twitter was used as a tool for finding victims, acquiring information, as well as offering support and donations. There is a notable increase in user-generated content as well as the presence of trending hashtags to boost engagement (Ağrali et al. 2022). According to studies (Eriksson 2012; Eriksson and Olsson 2016), hashtags make Twitter a viable tool for crisis communication. Hashtags make it easier to identify breaking news and share it with a larger audience of readers that are interested in that issue by allowing users to collect all tweets on a specific topic into one place.

The current figures show that Twitter has a sizeable global user base and is popular in a variety of nations, including Türkiye (Statista 2020). Individuals, organizations, and public figures in Türkiye use Twitter for a variety of objectives, including information exchange, personal communications, and political marketing (Akdenizli 2015).

From the 1999 İzmit earthquake until the latest 2023 Türkiye earthquake, there is a clear indication suggesting that the advances in technology greatly affected the way in which societies including governments respond to catastrophes of this kind.

Furthermore, social media, particularly Twitter, have become an important part of people's everyday life in Türkiye. In the country, the usage of social media platforms for communication, content sharing, and staying up to current on news and events has significantly increased (Dierks 2023). The proliferation of smartphones and increasing Internet access has also contributed to the widespread use of Twitter and other social media platforms in Türkiye. Technological determinism, which suggests that progress and advances in technology lead to advances and changes in society as a whole. It suggests that, through the evolution of technology, humankind is directly influenced and shaped through these means in order to follow the improvements and adapt to them. Technological determinism and technological innovations have a tremendous influence on society and affect numerous elements of human behavior and communication.

McLuhan asserted, "We shape our tools, and they shape us." This idea may be used to examine how technological growth and advancements contribute to societal changes, particularly in the setting of communication crises such as catastrophes and earthquakes. McLuhan contended that various media, including as print, radio, television, and digital technologies, expand and modify our sensory and cognitive skills, affecting how we

perceive and interact with the world. Advances in technology play a critical role in enabling communication and response activities in the face of communication emergencies such as catastrophes and earthquakes. According to McLuhan, the availability and usage of various media technologies affect communication patterns and reactions during such crises. Thus, media technologies enhance and emphasize the specific components of human experience.

In the context of communication crises, media technologies may increase the flow of information, both true and erroneous, with important implications for public awareness, response coordination, and public opinion. McLuhan proposed that media technologies foster a collective consciousness by facilitating the rapid interchange of information and linking people across distance and time. In the context of communication crises, the interconnection enabled by technology enables the exchange of real-time updates, emergency alarms, and resource mobilization.

As a result, advancements in technology, such as innovations in communication infrastructure, social media, and mobile connection, most certainly affected how the society in Türkiye responded to communication crises such as the earthquake in 2023, and influenced the flow of information, public perception, relief coordination, and the overall social impact of the catastrophes.

Advances in communication technologies have facilitated the rapid dissemination of information during crises, enabling authorities to communicate warnings, evacuation procedures, and relief efforts to the affected populations. Depending on McLuhan's notion, the medium used for communication, such as radio, television, or the Internet, influences the speed and reach of information dissemination, thereby affecting the effectiveness of response and recovery efforts. This applies to the role of social media role during crises. The advent of social media platforms has allowed individuals to become active participants in the dissemination of information, providing real-time updates, sharing personal experiences, and organizing grassroots relief efforts. The medium of social media empowers individuals to shape the narrative and influence public opinion during crises.

Additionally, a study from India looked into McLuhan's predictions about how the Internet will promote involvement and engagement. This study discovered that social media adhere to McLuhan's theory that technology is an extension of the body and that media are an extension of the human mind. The media landscape has changed, and the duties and responsibilities of reporters and editors have been impacted by social media's expansion of journalists. The growing professional usage of social media by journalists and editors confirms McLuhan's predictions regarding the impact of the Internet on media practices (Gupta and Kumar 2020).

In his 1964 book "Understanding Media: The Extensions of Man," McLuhan established the notion that "the medium is the message." Despite the absence of social media and the Internet in his day, McLuhan predicted that modern electronic communication will have a significant influence on social life, norms, and community. Today, social media play a significant role in academics and other facets of daily life, facilitating communication and information sharing through platforms like WordPress, Twitter, Instagram, and YouTube (Robbins and Singer 2014). As a result, this forecast has gained even greater relevance.

Each technology, medium, or social media platform including Twitter has its own inherent properties or characteristics that shape the way in which people perceive and interact with the world. According to McLuhan's famous aphorism, "The medium is the message," the method of communication has a bigger influence on society than the actual content of the message (Euchner 2021).

Given his ideas, we may assume that McLuhan would have understood the transformative potential of social media platforms like Twitter in crisis communication. Twitter and other social media platforms offer a quick and engaging platform for information sharing, enabling users to publish real-time updates and connect with their audience. This is consistent with McLuhan's idea that technology may be viewed as an extension of human communication, allowing for the rapid and extensive flow of information during emergencies.

Additionally, given that Twitter permits the creation of virtual communities and promotes collective reactions during catastrophes, McLuhan would have likely recognized it as a significant instrument for crisis communication given his emphasis on the influence of new media on society and community. According to McLuhan, the quick information dissemination and support mobilization capabilities of social media platforms will have a significant influence on societal norms and behavior.

While there are no particular references to McLuhan's direct foreknowledge of platforms such as Twitter, his core theories about media and technology give useful insights into how he would have seen the function of social media in crisis communication. In the context of the ever-changing digital landscape, his forward-thinking approach to media and its impact on society remains relevant and thought provoking.

When discussing these technological advances concerning the emergence of Twitter, it can be noted that, in 1999, when technologies like Twitter were nonexistent, the means of receiving information were limited to traditional media, which led to an immense time gap, wherein the population was not receiving up-to-date information quickly and in a systemized manner. The people's reliance on traditional media was not sufficient in order to directly help those in need; it can be said that the traditional media does not meet the needs in crises but only conveys the news (Şahinsoy 2017).

In contrast, during the 2023 earthquake, Twitter was greatly utilized for an array of different reasons. Primarily, the use of Twitter was for rescue and aid reasons but also for mobilizing volunteers, sharing live updates from the affected region, and for overall discussion regarding the incident. One probable explanation for Twitter's importance in Türkiye is its position as a medium for public diplomacy and political dialogue. Türkiye has actively used social media, especially Twitter, to promote political principles and the image of the Turkish president (Uysal and Schroeder 2019). Twitter has become a platform for political personalities and government officials in Türkiye to share information, convey personal messages, and engage with the public (Sobaci and Karkin 2013). Twitter's popularity and relevance in the country are largely due to its use by key personalities and the government.

The comparison between the three earthquakes in Türkiye, their periods, and the technology used directly supports the theory of the technological determinism. Twitter, as an online tool and platform for sharing information, has greatly affected the way in which society reacts to the earthquake and the way information is shared (Palen et al. 2007). The evolution of Twitter has shaped society and provided a better way of managing disasters of this type, as well as the ability to access relevant information quickly and systematically.

Next, analyzing the data collected from Twitter from the 30-tweet sample of the public suggests that there are patterns in the keywords and content that suggest three categories in which they can be sorted, namely:

- Call for help: this category includes tweets asking for assistance, calls for international help, calls for hospital treatments, food/water needs as well as donation needs.
- Impact and loss assessment: these tweets generally evolve around the damages surrounding the earthquake devastation such as death tolls, numbers of injured individuals, devastation of the infrastructure and businesses, as well as the aftermath of the most affected cities.
- Crisis in Türkiye and Syria: these tweets generally address the news about the crisis concerning both countries, generally mentioning simple terms such as earthquake, crisis, and the names of both countries.

When compared, there is a clear indication of the growth in Twitter's impact on crisis management and response. The usage of Twitter expanded from only being informational to allowing rescue and relief efforts to search for victims, using algorithms to find those affected, and generating online support and donations. The discussed analysis proves H1 that the positive determinism of the use of Twitter in communication crisis has evolved during the natural crises, which is shown by the development of its use during the most prominent earthquakes that struck Türkiye over the years.

According to Lasswell's model (Lasswell 1948), the media's surveillance function serves society as a whole by circulating information and news. The media act as a watchdog, observing and reporting on various aspects of society, such as political events, social issues, and environmental developments. By providing a constant flow of information, the media enable individuals and communities to stay informed about their surroundings and make informed decisions (Gever and Ezeah 2020). The findings of our study indicate that the media were crucial in the aftermath of the earthquake in enhancing environmental surveillance by giving real-time information, sharing eyewitness accounts, and assisting in the coordination of rescue and relief activities (Susarla 2023).

The media's involvement in surveillance includes the collection and broadcast of environmental information. Lasswell's model emphasizes the role of the media in this monitoring function. However, the media's capacity to fulfill this job was severely hampered during the 6 February 2023 earthquake's communication crisis. A framework for comprehending the relevance of information flow and the media's capacity to monitor and report on the environment during times of crisis is provided by Lasswell's model's emphasis on the function of the media in surveillance. Twitter, in particular, had been a crucial forum for eyewitnesses to communicate videos, photographs, and personal accounts of the earthquake's impact, assisting with damage assessment and relief organization. This reinforces and proves H2 that Twitter is crucial for finding casualties, also known as geotagging, as well as being a main source of information and on-the-ground updates during the critical moment, which confirms the media's surveillance function.

The results show that the usage of Twitter during the first 48 h of the Türkiye earthquake provided sufficient results to determine that the usage of Twitter was extensive for the official accounts, informational accounts, as well as the public, and effectively aided the rescue and relief efforts, especially during the first 48 h of the catastrophe. Analyzing the results, there is a clear pattern of positive sentiment in the tweets focusing on the aspects such as the effective coordination of the rescue and aid, well wishes, international aid, unity, and state action suggesting the state's direct involvement in the crisis.

Additionally, the findings suggest that the tweets were related to keeping a positive public image, which can be observed through the content as well as the repetition of words, serving as a crisis management response. Moreover, several reoccurring keywords and topics appeared:

- Crisis response and management: tweets involving the government institutions are more prominent, mentioning the mobilization of the country resources, activation of the local administration, involvement of local administration, etc.
- Rescue and relief efforts are mentioned in the several tweets highlighting the fast and effective response of the rescue teams.
- Unity and solidarity are mentioned in order to overcome challenges as a nation while also accepting international help.
- Press conference as a crisis response is posted a day after the earthquake in collaboration with the disaster and emergency management authority and the state information coordination center in order to state the official information and disseminate any misinformation and fake news.
- Several tweets consisted of providing announcements about national mourning day as well as the declaration of state emergency in the affected provinces.

In the midst of the earthquake crisis, the users turned to Twitter in order to fulfill their needs. The needs differed from actively asking for help and assistance to fulfilling their cognitive and social integrative needs. In addition, as the theory suggests, the users have an active role in the media environment; in this case, Twitter and the case of the 2023 earthquake supports this theory through the collection of tweets gathered, their purpose, engagement, and intensity. This approved H3, that during the first 48 h of the 2023 earthquake in Türkiye, Twitter had considerable impact on rescue and relief activities. Moreover, it enabled individuals still trapped beneath the debris to contact, seek for, and receive assistance.

The president of Türkiye used Twitter to communicate directly, following the communicative models of the network society, which dispenses the gatekeeping of legacy media. This shows the importance of social media (such as Twitter) in crisis communication, given the greater relevance of communicative interactions over the Internet and the possibilities of one-to-one, many-to-many, as well as one-to-many communication.

The findings also suggest that president Erdoğan's communication via Twitter during the 2023 Türkiye earthquake may be discussed in light of Lazarsfeld et al.'s (1944) notion of opinion leaders. Opinion leaders are those who have a high level of influence and credibility within a certain social network and may affect the opinions and conduct of others. President Recep Tayyip Erdoğan, being a renowned political person and the President of Türkiye, might be regarded an opinion leader in this issue. The media environment and communication dynamics have changed dramatically since then, notably with the development of social media. While the notion may still be used to analyze information diffusion and impact, the role of opinion leaders may have grown with the rise of social media platforms such as Twitter, which allow for direct contact between primary sources and a larger audience.

President Erdoğan's engagement via Twitter after the 2023 Türkiye earthquake was critical in delivering information, expressing solidarity, and coordinating rescue and relief activities. Opinion leaders have attributes that make them influential within their networks. Expertise, accessibility, trustworthiness, and visibility are examples of these traits (Katz and Lazarsfeld 1955). As the leader of state, President Erdoğan has the authority and knowledge to confront and respond to the issue. His position gives him access to rapid and reliable information, allowing him to quickly provide earthquake updates and facts. President Erdoğan adopts the role of a reputable source of information amid the crisis by using his knowledge.

Furthermore, Twitter allowed president Erdoğan to directly engage with the public, improving his accessibility. As studies such as (Aldamen 2023a; Aldamen 2023c) have found that social media platforms affect the empathy and sympathy feelings of an audience towards vulnerable individuals in various forms. Twitter enables real-time contact, allowing president Erdoğan to engage with the afflicted populace and respond to their concerns, fostering a sense of connection and empathy.

Erdoğan's acceptability as a public figure stems from his political position and prior experiences. People are more likely to believe and follow the ideas of leaders they regard as trustworthy and honest (Katz and Lazarsfeld 1955; Katz 1957). President Erdoğan's historical track record of achievement and leadership through previous crises adds to his legitimacy, making his speeches powerful and effective. It can be argued that the president of Türkiye played the role of an opinion leader by utilizing Twitter to disseminate information, provide updates, and express his views on the situation.

Sobaci and Karkin (2013) discovered that mayors seldom utilize Twitter for transparent, participative, and citizen-oriented public service delivery. In Türkiye, mayors adopted and utilized Twitter mostly for self-promotion and political marketing. However, the results of our study showing the situation in the 2023 earthquake became different and the importance of Twitter has increased among government authorities in the field of media crisis management and calming people during disasters. The media's relevance in political communication grows because of its mediating function in the process of political communication between authorities and the public.

Users including officials turn to social media platforms in order to fulfill their needs, gain motivation, and gain gratification (Katz et al. 1974). As the gratifications of social media, including Twitter, can include utilitarian uses, which include self-knowledge, information, benefits, and experience, such as obtaining information about the latest news and crises and looking for help or aid (Aldamen 2023b).

Officials frequently utilize social media to solicit opinion in the form of a targeted survey, or they use their network to influence political discourse. This was evident, particularly in terms of the feelings and contents of the tweets. In this sense, a leader has affected

the sentiment of information given with the public, and followers who have heard this message have considered the authority and accepted the message as a general truth.

Chadwick (2017) analyzed the significance of ancient and new media logic in building a hybrid media system. He investigated how Donald Trump used this technique to his advantage during the 2016 US presidential campaign. Chadwick digs at three relevant elements of networked publics that have had substantial political impact: fake news, bots, and hacking. These occurrences, according to Chadwick, pose problems for democratic processes because they may alter information and affect public opinion.

The findings also gathered from the tweets of *@RTErdogan* suggest that the stream of tweets started on and were directly related to the 6 February 2023 earthquake.

As the analysis of the official AFAD's Twitter account suggests that the disaster and emergency management authority and the presidency used their Twitter account as an informational hub, providing up-to-date information about the disaster. Additionally, the account was used for posting announcements about the current state of the affected areas. The content can be categorized accordingly:

- Emergency response news and disaster management: these tweets revolved around the crisis situation in the affected areas utilizing the keywords such as disaster and emergency response, emergency management, response, relief efforts, disaster recovery.
- Social activism: these tweets revolved around the calls for volunteers and community commitment with the keywords such as search and rescue, volunteerism, community engagement, solidarity, and collaboration.
- Communication: these tweets mostly revolved around the importance of disaster communication utilizing keyboards, such as phone calls, SMS, and Internet messaging.

Using social media with other forms of media to deal with the 2023 earthquake in Türkiye is compatible with Chadwick's (2017) concept of a "hybrid media system." This, along with terms like "hybrid media events" and "ontology of hybridity," was used in a social science study. These concepts illustrate the convergence of traditional and new media logics in political communication, as well as how individuals with the ability to traverse information flows hold power. Using the example of the Giresun Province in Türkiye, Korkut (2022) found in her study on the social media usage of a political party provincial presidency other than during the election period that political communication is handled in two stages—election season and non-election season. The election cycle is the primary subject of political communication study. Campaigns, political commercials, voting patterns, party leaders' use of social media, the topics they post most frequently on social media, newspaper advertisements, and content analysis of themes such as between the studies accessible in the literature are all factors that come into play during election season. However, political communication that takes place outside of election seasons employs communication technologies to target particular groups and has a distinct importance. Chadwick (2017) also discussed the influence of the Internet and digital media on political communication. In addition, the impact of new communication technologies on political mobilization, engagement, news, and journalism is also discussed. His work has aided in the comprehension of the intricate relationships that exist between technology, politics, and society, particularly in the context of the Internet.

This may be observed in AFAD's use of Twitter during the earthquake to project a sense of control and resilience. This implies that government institutions understand the potential of social media platforms to affect public opinion and are actively using them to further their own narratives and agendas. This proves H4 that the importance of social media, especially Twitter, has increased in political communication by opinion leaders and government authorities in the field of media crisis management and calming people during disasters.

8. Conclusions

This study aimed at giving a comprehensive assessment of Twitter usage and contributing to the increasing corpus of research on the use of social media during crisis

circumstances, taking the 2023 earthquake in Türkiye as a case in point. When compared to previous earthquake disasters and their usage of Twitter, the conclusion can be drawn that Twitter usage has evolved and progressed through the years, from being nonexistent in the 1999 İzmit earthquake to being simply used for gathering information and finally to being actively involved in helping the rescue of victims in the 2023 earthquake. This conclusion is supported by technological determinism by displaying that the evolution of Twitter has greatly impacted society's ways of communicating during natural disasters such as the earthquake. Twitter, as a social media platform, has become an irreplaceable tool for both gathering information as well as assisting and finding those in critical areas.

The findings showed that Twitter usage has evolved over time, from gathering information to actively supporting victims' rescue. The media's surveillance function serves society by circulating information and news, and Twitter was a crucial forum for eyewitnesses to communicate videos, photographs, and the personal accounts of the earthquake's impact, assisting with damage assessment and relief organization.

The analysis of the usage of Twitter during the first 48 h of the Türkiye earthquake provided sufficient results to determine that the usage of Twitter was extensive for both the official accounts and informational accounts, as well as the public, which has effectively aided the rescue and relief efforts, especially during the first 48 h of the catastrophe.

The president of Türkiye used Twitter to attempt to control the damage and calm the public, and the official AFAD account offered hourly news and updates about the current situation. President Erdoğan's engagement via Twitter after the 2023 earthquake was critical in expressing solidarity and coordinating rescue and relief activities. This study concluded that Twitter has become an indispensable tool for obtaining and disseminating information, aiding, and identifying individuals in need. It was widely used by official accounts, informational accounts, and citizens, and effectively aided rescue and relief efforts, especially in the first 48 h after the disaster. The public utilized Twitter in several ways, from asking for help and assistance to searching for news and up-to-date information to donating and offering help. The importance of Twitter usage during times of crisis has been showcased, and the need for the development of easier tools for database searching has been highlighted by this research.

Twitter developed into an effective medium for crisis communication, especially after natural catastrophes such as earthquakes. According to the studies, the use of Twitter for communication during times of disaster, such as earthquakes, is increasing. As the use of social media platforms such as Twitter grows, their function in crisis communication becomes more important. Several technologies and apps have been created in recent years to extract meaningful information from Twitter during natural disasters for successful disaster relief operations. Authorities can use these tools and software to monitor real-time updates, assess the needs of impacted areas, and deploy resources accordingly.

The crisis communication of the 2023 Türkiye earthquake involved information dissemination, coordinated response efforts, public engagement, ethical communication practices, and the media's role in shaping public understanding. In addition to the crisis, it highlighted the crucial role of the media in facilitating the surveillance of the environment and the potential consequences when access to information is impeded.

9. Study Significance, Limitations and Future Research

The significance of this study may be reflected in a variety of domains, including crisis management, disaster communication, and social media studies. This study may provide insights into what social media platforms may offer during a crisis and how the utilization of these communication channels might assist in designing more efficient disaster resources and recovery efforts in the future. Furthermore, the research might give insights on how this social media was used as a communication tool for the people impacted, rescuers, and the broader public. These data might be utilized to design more complex communication strategies in impacted areas, where all other modes of communication are unavailable. Furthermore, media researchers might utilize the study to understand the influence of

social media during the crisis, the consequences it has on individuals impacted, and how social media can be contrasted to traditional ways of delivering information. It will assist in stimulating talks about Twitter data sharing, new API key regulations, and how this might negatively affect the usage of this social media in crises.

However, more future research is needed in order to display the extent to which Twitter usage helps rescue and relief efforts; however, this research has provided enough data to conclude that the usage of Twitter did have positive effects for both the individuals asking for help as well as those searching for information and ways to help. Moreover, extensive research needs to be performed in the fields of Twitter database categorization and the development of tools to facilitate the navigation of large quantities of data.

Twitter users can offer important statistical data, which may then be used to construct more advanced algorithms for hashtag tracking, victim location, and rescue dispatch. As a result, future research can build on existing case scenarios, such as the one presented in this study, to develop a better understanding of how social media affects not only daily life, but also how it can be used during times of disaster and crisis.

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