

Natural Disaster Events and Social Media: An Orderly Mechanism for Online Rescue of Multiple Subjects

Guobin Deng (✉ dengguobin@glut.edu.cn)

Guilin University of Technology <https://orcid.org/0000-0002-1411-9163>

Qing Zhang

Guilin University of Technology <https://orcid.org/0000-0002-2959-4311>

Research Article

Keywords: Natural disasters, social media, online disaster relief, torrential rain event in Henan, China

Posted Date: March 21st, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1071484/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Giving full play to the various roles of social media in the emergency rescue of natural disasters is an effective way to improve the existing disaster relief mechanism and improve the efficiency of rescue. "Online Disaster Relief" is supported by modern information technologies, and various entities are used to coordinate the orderly behavior of various rescue resources through online methods to improve rescue efficiency. From the perspective of field theory, this research analyzes the operating mechanism of the online disaster relief work with the 7/20 torrential rain in Henan as a case. Research has found that social media platforms rely on their powerful technical support and information interaction functions to construct a specific field space, promote resource coordination and exchange among subjects, and reconstruct habitual behaviors. At the same time, a behavioral coordination mechanism with consistent goals, a standardized and orderly information interaction mechanism, a rational and powerful social mobilization mechanism, and a self-management mechanism for multiple subjects have been formed in the field, which promote the orderly progress of online disaster relief work, thereby improving the rescue efficiency.

1 Introduction

Natural disasters refer to events caused by natural phenomena, not controlled by human beings, which will cause damage to human survival, social development and living environment. They mainly include floods, typhoons and droughts, with the characteristics of suddenness, regionality, and inevitability, etc. According to a comprehensive analysis by the World Meteorological Organization (WMO), in the past 50 years, the world has been hit by natural disasters, and various disaster events have had a huge impact on the world's economic development and human survival. An average of 60,000 people die from natural disasters globally each year, and the death toll caused by disasters in the past decade accounts for 0.1% of the total death toll (Hannah Ritchie and Max Roser, 2019). Among them, water-related disasters dominate the list of disasters that cause human and economic losses. The economic losses caused by floods and storms in Europe in 50 years have been as high as US\$3,775 (WMO). The unpredictability and uncontrollability of natural disasters have brought huge challenges to the emergency rescue work of various countries. Figure 1 clearly shows the death toll caused by the four disasters in 2017.

Social media is a two-way media form that provides users with interaction and dialogue. It relies on Web2.0 Internet technology to realize information transmission, real-time sharing, and communication and interaction functions through text, pictures, and videos. Currently, the commonly used social media mainly include Facebook, Twitter, WeChat and microblog. According to a global digital report jointly released by We are social & Hootsuite, as of January 2021, global social media users have reached 4.2 billion, accounting for about 53.6% of the world's total population. The number of global social media users has increased by 490 million compared with last year. On average, more than 1.3 million new users join every day. The global Internet users spend nearly 7 hours on all devices on the Internet every day. It can be seen that social media have become a "necessity" in people's lives, and the huge structure of netizens provides a strong support for the development of social media. In recent years, social media

platforms have played an increasingly prominent role in emergency rescue work. Governments and other disaster management agencies have begun to build online management models (Maura C. and Allaire, 2016). At the same time, social media platforms have gradually become an important tool for the public, social organizations, rescue teams and other entities to master and release real-time information, coordinate rescue resources, and mobilize offline disaster relief. Compared with mainstream media, social media can use its shared network and technical system to realize instant communication in natural disaster events (Crowe, 2012), provide real-time disaster information (Merrifield and Palenchar, 2012), and have the characteristics of universality, real-time, and cross-platform. With the innovation and development of modern information technology, social media has become an important tool for emergency rescue after disasters.

The online disaster relief carried out by various entities relying on social media platforms has become an important part of the emergency rescue work after the disaster. Online disaster relief mainly refers to the collaborative behavior of various entities relying on social media platforms to help offline disaster relief work through the orderly transmission of disaster relief information, coordination of rescue resources, mobilization of offline people, and accumulation of social capital. However, the complexity and disorder of social media user behavior will have a certain negative impact on disaster relief efforts. Therefore, how to give full play to the role of social media in disaster relief is a topic worthy of study.

In July 2021, during the torrential rain event in Henan, China, social media users showed the world a successful sample of online and offline disaster relief work. Therefore, the conceptual framework of this study is based on emergency rescue and field theory. Taking the above incidents as examples, we summarize and sort out the operation mechanism of the five types of subjects: government, mainstream media, social media platforms, social rescue teams, and individual users to carry out of online disaster relief work in an orderly way. This provides experience and reference for online rescue work in various countries.

The structure of the thesis is organized as follows: The second part is the literature review and the definition of related concepts; the third part elaborates the theoretical basis of this article in detail; the fourth part introduces the research case of this article in detail, and analyzes the case in combination with the theoretical basis; the fifth part summarizes the operating mechanism of online disaster relief by multiple subjects based on social media platforms, and discusses it in detail; the sixth part is the conclusion; the seventh part briefly describes the limitations of the research and future research directions.

2 Literature Review

2.1 The function of social media

Social media is the general term for the development of online systems (Crowe, 2012). Today, social media has attracted a series of disaster relief organizations such as the Federal Emergency Management Agency (FEMA) with its advanced technical support and powerful functional design, and has been widely

used in crisis management. In the early days, government agencies only used social media as a one-way communication and communication channel (Mergel, 2013). Over time, the two-way communication and information sharing functions of social media have been widely used, and the transparency of government affairs has gradually increased (Mergel, 2016). Nowadays, with the innovation and improvement of the functional design of social media platforms, its role in disaster emergency rescue work can be summarized as the following four types:

1. From the perspective of the government, social media platforms are the main channels for emergency management agencies to transmit information throughout the entire cycle of disaster prevention, mitigation, preparation, response and recovery (Wukich and Mergel, 2015). The government can use social media platforms to quickly and efficiently disseminate information to the public, accurately locate and arrange rescue work (Finch et al., 2016). At the same time, it can also evaluate public sentiment through monitoring, analysis and interpretation of social media content (Zavattaro, French, and Mohanty, 2015). Seren and Michele (2017) believe that in the long run, government agencies must maintain the presence of social media in order to keep abreast of the availability of recovery information, monitor the community's feelings and ideas about recovery, and participate in ongoing negotiations on disaster and recovery responsibilities.
2. From an organizational perspective, the application of social media helps rescue teams to rationally arrange rescue resources. More and more disaster relief organizations have begun to conduct two-way dialogues with disaster victims, potential donors and volunteers through social media platforms, which helps to quickly transmit information such as assistance needs and donation willingness (Yan and Pedraza-Martinez, 2019), so as to provide a basis for the allocation of relief resources and actions (Wang and Taylor, 2018).
3. From the perspective of the society, studies have shown that media attention can effectively promote the disaster relief operations of enterprises and provide a material basis for the relief work of the government and non-profit organizations (Ouyang et al., 2017). The Sharp and Carter (2020) study found that the use of social media has a strong role in the recruitment, organization and management of volunteers during disasters.
4. From an individual perspective, it is helpful for the victims to carry out self-help and mutual rescue. Victims can quickly transmit information through social media and seek help from surrounding people and rescue teams (Beigi et al., 2016). Compared with non-social media users, social media users enjoy more information and are more able to make better decisions regarding safety and seeking asylum (Stokes and Senkbei, 2011).

2.2 Online disaster relief concept

From the above analysis, it can be seen that social media has played an extremely important role in disaster emergency rescue work. Social media is no longer just a means for users to exchange and transmit real-time disaster information and rescue information, but an important platform for multiple subjects to coordinate rescue resources and help offline disaster relief. This article defines "online disaster

relief" as: the government, rescue organizations and other entities coordinate the orderly behavior of various rescue resources online, supported by a series of modern information technologies such as the Internet, communications, and big data, to improve rescue efficiency. Today, online disaster relief based on social media platforms has become an important part of disaster emergency relief work.

However, today's online disaster relief work still faces greater challenges. Because social media has a low level of restraint on user behavior and faces a wide audience, the convenience and low cost of users to post and transmit information have caused serious problems in the disorder of platform user behavior. The falseness of the statements on the platform and the deliberate guidance of criminals can easily confuse platform users' vision, disrupt online emergency rescue coordination, and have an impact on offline rescue. Therefore, how to make full use of the various functions of social media to promote the orderly progress of online disaster relief work is one of the problems that need to be solved urgently.

2.3 Existing research

At present, there are mainly the following four researches on crisis management and social media in academia.

1. The use of social media data text in disaster management explores the possibility of integrating data information and other information in social media. De Albuquerque et al. (2015) proposed a geographic method that can improve the existing monitoring system by combining the data information in social media and the geographical feature value of the disaster. Xing et al. (2021) developed a disaster impact assessment method that integrates social media data and mobile signaling data. Fang et al. (2018) constructed a disaster impact assessment framework based on social media data in their research. The research proved that social media has a greater role in identifying disaster processes in China and assessing the impact of disasters.
2. Analyze the role of social media in the full cycle before, during and after the disaster. Houston et al (2014) combed through various documents from 2012 to 2013, described the functions and roles of social media platforms in various stages through inductive coding, and constructed a disaster social media that includes pre-, in- and post-study frame. Ngamassi, Ramakrishnan and Rahman (2016) studied the application of social media in disaster management through content analysis. In the mitigation phase, the use of social media can help reduce disaster losses and casualties; in the preparation phase, the use of social media can help enhance the response capabilities of organizations and communities; in the response phase, the use of social media platforms can provide emergency assistance to those in need; in the recovery phase, the use of social media platforms can help speed up recovery after disasters.
3. Factors affecting the use of social media in disaster management. Williams, Valero and Kim (2017) found that the public's trust in local emergency management agencies can affect the public's willingness to use social media.

It can be found that in the field of social media and disaster management, scholars have conducted in-depth research on the functions, data applications and influencing factors of social media using different methods and based on different theories. However, there are very few literatures from the perspective of multiple subjects to analyze the resource exchange behaviors and dynamic relationships of various subjects in online disaster relief after disasters.

3 Theoretical Foundation—Bourdieu's Theory Of Fields

The theoretical basis of this article is Bourdieu's field theory. Field, habituation and capital are the three core elements of this theory. The original goal of Bourdieu's construction of field theory was to analyze the specific historical field of French society. Therefore, in order to use field theory correctly, three core elements must be put in the specific context of the study and its meaning must be carefully reconstructed. Then explore the connection between these core elements (Singh, 2019). The "field" is composed of a network of relations between various positions attached to a certain power (or capital), and is determined by the state of relations between positions at a given point in time. Any change in the state of the relationship between locations will lead to changes in the entire structure (Ferrare and Apple, 2015). "Habitus" is an internalized mental or cognitive structure that is persistent but variable (Bourdieu 1991, 53), and actors can often perceive through habituation. "Capital" is the accumulation of labor in tangible and material forms (Bourdieu 1986, 241), which mainly includes three forms: economy, culture, and society. And it is a key factor in explaining the internal logical relationship between actors in the field. In recent years, the citation rate of Bourdieu theory in education, media studies, family and other fields has gradually increased (Sallaz and Zavisca, 2007). Bourdieu believes that society is composed of different fields. In a field, participants enjoy different types of capital according to their status and role. The capital they own and the public relations in the field are in a dynamic process of constant change. Compared with other resource theories, the advantage of using field theory for analysis is that it focuses on the relationship study in the field and the dynamic study of the internal structure (Ihlen, 2007).

The research purpose of this article is to analyze the cooperative behavior of each subject in the field, and build an orderly framework for online disaster relief. Therefore, field theory has strong explanatory and applicability to this article. Next, this article regards the social media platform after the sudden natural disaster event as a public field, and reconstructs the specific meaning of the three core elements of field, habituation and capital in combination with specific situations. At the same time, it analyzes the relationship status between the subjects in the field.

3.1 Field Space

Social media builds an information interaction platform for users based on strong technical support and data processing capabilities. A series of functions of social media platforms are built on the behavior of countless users. A web analytics company Alexa.com research found that eight of the ten most visited websites rely on user-generated content (Di Gangi and Wasko 2016). Therefore, this article regards social media platforms as a field space, as shown in Figure 3.

The multiple subjects in Figure 3 have jointly contributed to the orderliness of online disaster relief work: First, the government plays a macro-control role in disaster relief work and is responsible for the formulation of emergency strategies; at the same time, the information released by the government is the most authoritative and guides the remarks or actions taken by social media users. Second, external forces mainly provide capital, technology, human resources and other capital to participate in emergency rescue work. Third, professional rescue teams are the main undertakers of rescue missions. Fourth, although public information published by traditional media has a slower update and dissemination rate than personal information, its influence and authority far exceed those of individual users in social media. During the emergency rescue period, the real-time coverage of disasters by traditional media is more authoritative than the information transmitted on the Internet, and it has a stronger influence on the direction of public opinion of Internet users. Fifth, emergency managers who operate social media accounts usually play an information review role in the platform (Hughes et al., 2014). Platform managers provide technical and regulatory services, screen platform information, supervise user behavior, and provide a good communication environment for other subjects. Sixth, individual users are the forces with the most extensive participation, the largest number, and the most complex personnel composition in social media. According to whether they are affected by disasters, individual users can be divided into disaster-affected users and non-disaster-affected users.

3.2 Capital Exchange

In the field of social media, the main factors affecting user participation can be divided into two perspectives: personal participation and personal meaning (Di Gangi and Wasko 2016). Users can perceive the strength of their role in the social media platform, and can also perceive their own value realization degree. Therefore, the participation behavior of users in the social media field can be regarded as the exchange and achievement of the social value of both parties in the field.

This article studies the social media field under the influence of disaster events. After the disaster event, the role pursued by users and their own value have changed, and the objective relationship between the various actors and the distribution of resources in the social media field have also changed. The resources in the entire field are leaning towards users affected by the disaster. As the macro-coordinator of the field, the government is responsible for the coordination of all resources in the field to ensure the orderliness of rescue. External forces mainly refer to non-profit organizations, enterprises, etc., which provide a large amount of capital and human capital for disaster relief work. Traditional media mainly provide information capital, report disaster-related information in real time, ensure the authenticity of information on social media platforms, and timely broadcast help and rescue information to the public in real time, guide the behavior of social media users, and avoid waste of online resources. Various social rescue teams mainly provide human capital and are recipients of online rescue information. Various social media platforms provide technical support for online rescue, and at the same time, they are also the last step in integrating rescue information and converting online into offline actual rescue operations. As the main body of online disaster relief, individual users are responsible for the three roles: information release, transmission and reception.

In addition, online social mobilization will also have a certain positive effect on offline actions. User attention in social media is likely to trigger individual offline actions, resulting in the continuous growth of the rescue volunteer team, providing social capital and human capital for rescue.

3.3 Habitual Behavior

Bourdieu interprets “habituation” as a state of habit, which is the character, behavior and other characteristics transformed from the precipitation of early social experience, which is sustainable and convertible. Habitual behaviors in the social media field mainly include the following: (1) Reprocessing of information. During the exchange and sharing of news and information, users will add some subjective judgments to reprocess the original news and information content. (2) Perceptual emotions dominate. In the Internet era, the information acquisition environment provided by social media platforms for each user is equal, and each user uses it as a platform for self-expression. Therefore, emotional catharsis information can easily become the main dissemination content in the early stage of emergencies. So as to cover up valuable rational information. (3) Scale effect. Once an emergency disaster event is released, the acceptance of social media users is extremely high, and it is easy to form a scale effect after rapid dissemination.

4 Case Analysis

4.1 Torrential Rain Event in Henan Province

China is one of the countries most severely affected by natural disasters in the world. According to statistics from the Ministry of Emergency Management of China, various natural disasters in China in the first half of 2021 caused a total of 28.019 million disasters, 156 people died and disappeared due to the disaster. Henan Province is China's transportation and economic hub. It straddles the four major river basins of the Haihe River, the Yellow River, the Huaihe River and the Yangtze River. The terrain is high in the west and low in the east. Due to its special topography and climatic conditions, as well as many rivers in the water system, flood disasters frequently occur in Henan Province. Since July 17, 2021, affected by typhoons and subtropical high-pressure air currents, large-scale heavy rainfall has begun to occur in Henan Province, and rainfall in many places has broken historical records. Severe water accumulation and flooding occurred in most cities in central and northwestern Henan.

From 0:00 on July 20 to 0:00 on July 21 (International Standard Time), the central and northern part of Henan Province ushered in the highest rainfall peak in history. The maximum rainfall in some areas of Zhengzhou City reached 201.9 mm (8:00 to 9:00 international standard time), breaking through the extreme hourly precipitation in mainland China, with a daily rainfall of 696.9 millimeters, exceeding the average annual precipitation indicators in Zhengzhou. According to official statistics, from 12:00 on the 17th to 12:00 on the 20th (international standard time), according to the precipitation per unit area on the horizontal surface of Zhengzhou, the total amount of precipitation in the three days reached 4594.9 million cubic meters, and the capacity of nearly 317 West Lake reservoirs. The heavy rain caused the entire Zhengzhou metro line to be suspended, and railways, highways, and routes were all seriously

affected. As of 4:00 on July 28 (International Standard Time), according to the statistics of China's Natural Disaster Management System, the incident caused a total direct loss of approximately US\$13.758 billion. The affected area of crops reached 1021.4 thousand hectares, 13.6443 million people were affected, and 73 people were killed.

The heavy rain in Henan has attracted special attention from users on social media platforms such as Sina Weibo and WeChat. Sina Weibo is China's most popular Twitter-like website. It has private messaging, image upload and video sharing functions, and supports conversations and rebroadcasting. WeChat is China's most popular application that provides instant messaging services. Its functions are similar to Facebook. It supports instant messaging and social functions for sharing streaming media content.

As of July 27, 2021, about 10.178 million discussions on the topic of "Henan Rainstorm Rescue", with 6.34 billion readings of the topic; about 8.289 million discussions on the topic of "Henan Rainstorm", with 6.95 billion readings. There are a total of 455 topics related to "Henan Heavy Rain" on Sina Weibo. On July 21, 2021, China Central Television's client opened the "Henan Rainstorm Emergency Mutual Assistance Platform" to provide information and assistance channels for the people affected by the rainstorm in Henan. Social media platforms such as Weibo and WeChat responded in succession. Netizens use social media platforms to follow the trend of natural disasters in real time, and forward and spread the help-seeking information of various disaster victims and the rescue contact information of various professional rescue teams. Users have spontaneously formed an orderly information diffusion order on social media platforms, and it has become an important part of the emergency rescue team.

It can be seen that the online disaster relief mechanism jointly established by users relying on social media platforms played an indelible role in this disaster relief work and provided a more successful case sample for follow-up research. Therefore, it is reasonable and scientific to use this case to investigate the current operating mechanism of social media online disaster relief work.

4.2 Construction of social media field space under sudden natural disasters

The extreme rainstorms encountered in various parts of Henan Province have the characteristics of long duration and strong short-term rainfall. On the evening of the 20th, due to heavy rain, a Zhengzhou Metro Line 5 train was trapped in a tunnel while it was running. With the continuous rise of water levels in the tunnel and carriages, the air in the subway became thinner and the trapped passengers in the subway were in critical condition. Some trapped people have posted relevant distress videos on social media such as Weibo and WeChat. As a result, a series of distress videos on this topic have attracted the attention of netizens, who have forwarded and commented on them, and actively contacted relevant government rescue departments, government official media and traditional media through online and offline channels. Fire rescue forces are the first to launch rescue operations. The reposting and discussion by a large number of social media users has made the topic continue to rise, and Weibo has successively topped topics such as Henan rainstorm mutual assistance, Henan rainstorm rescue, and the first line of flood prevention and rescue. This heavy rain event in Henan has aroused the attention of people across the

country. Then, as the torrential rain continued, the disaster became more serious, the ground water level continued to rise, and a large number of people were waiting for rescue. People in the rest of the disaster-stricken areas have also begun to rely on social media platforms to publish and forward rain-related videos and various help messages. Traditional media began to conduct on-site investigations and follow-up reports on the disaster, and government official media also began to release relevant authoritative information to provide official explanations for the development of the disaster. Various professional rescue teams quickly launched rescues. Non-profit organizations, enterprises, social charities and all caring people have donated money and materials to assist the disaster-stricken areas.

4.3 Overall allocation of rescue resources

Under the violent rainstorm, the number of people waiting for rescuers is increasing, and the information is scattered, and contact channels such as phone calls and text messages are blocked. The collection and release of rescue information by government departments alone is far from being able to meet the rescue needs at this time. Therefore, the role of social media platforms began to emerge at this time, and various online social media have become important platforms for collecting help-seeking information and communicating the contact information of new rescue teams.

First, in the construction of social media platforms, the channels for collecting and disseminating rescue information have been improved. Platforms such as WeChat and Sina Weibo have opened emergency rescue portals to facilitate help seekers to fill in rescue information and speed up the collection of rescue information.

Second, in terms of resource allocation, the resource exchange behavior between subjects in the field always aims to improve rescue efficiency. In this incident, the government, as a macro-controller, is responsible for coordinating various resources and avoiding waste of resources. For example, during the rescue process, CCTV urges people who have been rescued to delete relevant information in a timely manner to prevent resource abuse. The mainstream media released information on the disaster area through their official accounts, providing a basis for users to identify the information. As the recipient of online rescue information, the rescue team actively carries out various rescue work and updates the rescue situation in real time. In addition, individuals in this incident were more rational and self-conscious, and actively screened and filtered wrong or useless information in the process of transmitting information. In addition, due to the impact of the site environment, some users have established volunteer services in the community, specializing in the screening and integration of rescue information

During the disaster relief process of this incident, the subjects spontaneously formed a relatively orderly and standardized participation mechanism, which effectively promoted the rapid integration and sharing of online and offline disaster relief forces, and improved the efficiency of rescue work in the disaster area.

4.4 Refactoring the habitual behavior of social media users

With the innovation and enhancement of technologies that support the operation of social media platforms, platform management capabilities have become stronger. Big data technology provides technical support for screening information on social media platforms. Operators reasonably develop big data tools to analyze and identify massive amounts of information in the platform, which is helpful for the timely delivery of effective information. With the expansion of social media users, social media has gradually become a public information dissemination platform. The public and popular features of information dissemination in social media have become more prominent, directly bringing hot events into the area of public discussion. Rational information dissemination gradually replaces the catharsis of personal emotions, information directly enters the stage of group discussion and dissemination, and the orderliness of user behavior is enhanced. In addition, the media literacy of social media user behavior has also been greatly improved.

5 Operating Mechanism Of Online Disaster Relief Work On Social Media

In the disaster relief work of the heavy rain event in Henan province on July 20th, the online emergency rescue work based on social media platforms once again demonstrated its special role. When sudden disaster events occur, the speed of traditional media receiving information is far less than social media. This is because social media users in disaster areas often use the platform to post the first information about the disaster. Due to the zero time difference of information transmission, this series of information can be received by platform users and continuously forwarded once it is sent, and the popularity has gradually formed. Later, various traditional media began to intervene, sending reporters to investigate the disaster area, verifying the information that had been circulated, and conducting real-time follow-up reports. Government departments also began to make official reports on the disaster to avoid the spread of rumors and other information, and actively launched offline rescue work. With the increasing popularity of the event, different hot topics began to appear, and the number of social media users participating in the topic increased sharply. Figure 4 is an operation diagram based on the behavior and event trend of various subjects on the social media platform in the Henan heavy rain event.

Our research found that these five types of subjects have formed a consistent behavior coordination mechanism, a standardized and orderly information interaction mechanism, a rational and powerful social mobilization mechanism, and a self-management mechanism of multiple subjects in the online disaster relief work. This helps the social platform to give full play to its functions, stimulates the vitality of online rescue, and promotes the rapid integration and sharing of online and offline disaster relief forces. The details are as follows:

5.1 Coordination mechanism with consistent purpose

The universality and complexity of the audience on social media platforms determine that the participants of online disaster relief work should also have the characteristics of diversity and differentiation. Consistent behavioral goal is an important prerequisite for collaboration between subjects.

In the final analysis, the online rescue work is carried out to improve the overall rescue efficiency. Therefore, the series of behaviors of various entities based on online platforms should be based on improving rescue efficiency. Then, according to the capital and ability possessed by oneself, formulate corresponding behavioral strategies. When the personal goals of a large number of users on the platform are consistent, a certain consensus will be formed among users, thus forming a joint rescue force. The degree of collaboration between subjects is a key factor in determining the effectiveness of online work. One of the reasons for the orderly operation of online disaster relief work in the above cases is the construction of a government-led cooperation mechanism, social coordination, disaster victims self-rescue, public participation, and platform management. In the field, the resources owned by various subjects are not the same. Constructing a behavioral coordination mechanism with the same purpose helps the integration and sharing of resources between subjects, enhances the rationality of users' behavior, and promotes the formation of a linkage mechanism between online and offline rescue work.

5.2 Standardized and orderly information exchange mechanism

Social media has powerful information interaction functions, giving all kinds of users the right to communicate and interact freely on the platform. In online disaster relief work, information exchange is the most important link in achieving action goals. The government coordinates and directs the work of various rescue teams. At the same time, it summarizes the disaster relief emergency plan and the rescue contact information of each region and publishes it on the official government website, major social media platforms and other places. With the forwarding of a large number of users, the information began to spread on a large scale. In addition, people affected by disasters can also use social media platforms to post help information, attaching accurate locations and the number of people to be rescued, which helps rescue teams to accurately locate them.

In this case, in order to solve the problem of the scattered distribution of rescue information, the official accounts of the government and mainstream media have set up online emergency rescue portals in the platform, and the platform managers give technical support. The establishment of an online emergency assistance portal will help promote the flow of information within the platform and enhance the orderliness of user behavior. Secondly, it also greatly reduces the workload of collecting rescue information, facilitating the verification of the authenticity of various types of information, and ensuring the rational use of rescue resources.

5.3 Reasonable and powerful social mobilization mechanism

The interactions and emotional expressions of users on social media platforms for emergent disaster events are extremely easy to produce emotional effects, so that some users with low levels of participation and processing wait-and-see status also have similar emotions. In particular, the emotional expressions and behaviors of opinion leaders among social media users on events can easily form a "circle effect" in their interpersonal circle, and even cause large-scale user group actions. For example, entertainment stars have a strong fan base and he can use his own influence to mobilize the masses of fans to increase the power for rescue. In this heavy rain event in Henan, well-known companies, clothing

brands, and entertainment stars have all used social media platforms to release information on disaster relief donations to encourage the public to raise funds. Various charitable organizations use social media platforms to release funding channels, as well as Various social volunteer teams also release volunteer recruitment information on the platform, and the social media platform has become a mobilization channel. As of July 23, according to preliminary statistics, a total of more than 245,000 social rescue forces have been involved in rescue and disaster relief. As of 3 pm on the 27th, the official website of the Henan Charity Federation announced that there have been donations of more than 482.36 million dollars by caring individuals and companies. In this disaster relief work, the social media platform fully demonstrated its strong social mobilization capabilities and raised abundant manpower, funds and social capital for offline disaster relief work.

5.4 Long-term monitoring mechanism of multiple subjects

In the past disaster relief work, online information interaction often showed a state of disorder. However, in this incident, platform management, media guidance, and the general public all played a powerful role in supervision. First of all, the management mechanism of social media platforms for online user information plays a key role in enhancing the standardization of online information. The selection, integration and refinement of network information by platform managers will help the technological improvement and order rectification of the network platform, and better play the role of social media as a media connecting online and offline disaster relief work. Second, the front-line disaster information updated by mainstream media in real time is an important basis for the public to judge whether the information is correct or not. Most mainstream media have independent management mechanisms, and are mostly composed of professional media practitioners, with certain professional ethics, and the information they release has strong authority. Therefore, users can self-filter and screen the information they own according to the real-time broadcast of mainstream media, and can also check and supervise the information released by others. Third, the strengthening of social supervision and the enhancement of user self-management awareness. Social supervision is an important guarantee for ensuring platform environmental safety and reasonable order. In social media, users act as "information gatekeepers", so user awareness is very important. In this incident, the user's sense of responsibility was very strong. Through official information notifications from the government and mainstream media, actively verify and filter false information on the Internet instead of blindly following it. At the same time, some users went deep into the disaster area in order to verify a certain news and dispel rumors.

6 Conclusion

The article first reviews the existing literature and analyzes the various roles of today's social media platforms in disaster emergency rescue work from the perspective of subject. The study found that the existing social media, relying on its powerful functional design, is no longer just a means of communicating and transmitting information between users, but an important tool for coordinating rescue resources and improving offline rescue efficiency. This article refers to the series of actions carried out by various entities relying on social media platforms to assist offline rescue as the "online disaster

relief" work of multiple entities. In the online disaster relief work of sudden natural disasters, the social media platform serves as a field space. The government, various rescue organizations, mainstream media, platform managers, and individual users are the five types of subjects in the field space, each holding different types of resources. The government mainly assumes the role of macro coordinator, responsible for resource coordination and restraint guidance within the field. Mainstream media mainly assumes the role of information guide, timely broadcasting the latest news, and combating false statements in the platform. Platform managers mainly assume the roles of regulators and technology providers, responsible for the daily operation of the platform, supervising user behavior, and ensuring the effective operation of the platform. Various rescue teams are the recipients of online rescue information and the main body of offline disaster relief work. Individual users are the main force for communicating and disseminating disaster-related information.

In order to show more clearly the resource exchange behavior and dynamic relationship changes of various subjects in the field space, this article uses the extremely heavy rain event in Henan, China in 2021 as an example to analyze. The study found that the operating mechanism of social media online disaster relief is summarized as follows: (1) Construct a behavioral coordination mechanism with the same purpose, gather user consensus, and form a strong synergy in the rescue process. (2) Establish a standardized and orderly information exchange mechanism to promote the rapid flow and accurate transmission of rescue information and disaster information. (3) Build a rational and strong social mobilization mechanism that can raise various resources for emergency rescue work. (3) Build a rational and powerful social mobilization mechanism that can raise various resources for offline rescue work. (4) Constructing a self-management mechanism for multiple subjects will help the self-improvement of the platform, self-filtering and screening of user information, and improve the orderliness of users' rational awareness and behavior.

7 Limitations And Future Research

Although this research has done a more detailed analysis of the operating mechanism of social media online disaster relief work and the logical relationship between the subjects, it has revealed the generation process of the rising popularity of social media platform events in the process of sudden natural disasters. At the same time, it expounds the operational dynamics and phased process of disaster relief work in terms of social mobilization and information interaction. However, the research only stayed in the emergency rescue part of the disaster relief work, and did not elaborate on the two contents of pre-disaster prevention and post-disaster reconstruction. Moreover, the study only analyzed a successful case, which is not universal. In addition, this article only collects and analyzes the data in WeChat and Sina Weibo. Although social media platforms have some common features, there are also differences in the functional design and usage methods of the major platforms. The choice of research platform may affect the operation and effectiveness of disaster relief work.

Therefore, future research can supplement and verify the results of this article from the following three aspects: (1) Combining the entire disaster process, sum up the dynamic relationship and online

collaboration mechanism of each subject in different periods of the event; (2) Use the method of comparing multiple case, select the failed or successful online disaster relief cases in different countries, and dig deeply into the commonalities among these cases; (3) Choose multiple social media platforms to demonstrate.

Declarations

Compliance with Ethical Standards

- No potential conflicts of interest
- There were no studies involving human participants and/or animals

Competing interests

- The authors have no financial or proprietary interests in any material discussed in this article.

Funding

- The authors did not receive support from any organization for the submitted work.

References

1. Bourdieu P (1991). The genesis and structure of the religious field. *Comparative Social Research* 13:1–44
2. Bourdieu P (1999). *Language and Symbolic Power*. Harvard University Press, Cambridge
3. Bourdieu P (1986) The Forms of Capitals. In: *Handbook of Theory and Research for the Sociology of Education*. Greenwood Press, New York, pp 241-58
4. Beigi G, Hu X et al (2016) An Overview of Sentiment Analysis in Social Media and Its Applications in Disaster Relief. Springer International Publishing. doi:10.1007/978-3-319-30319-2_13
5. Crowe A (2012) *Disasters 2.0: The Application of Social Media for Modern Emergency Management*. Taylor and Francis Group Publisher, Boca Raton. doi:10.1201/b11890
6. Di Gangi P M, Wasko M (2016) Social Media Engagement Theory. *Journal of Organizational and End User Computing* 28(2):53–73. doi:10.4018/joeuc.2016040104
7. De Albuquerque J P, Herfort B et al (2015) A geographic approach for combining social media and authoritative data towards identifying useful information for disaster management. *International Journal of Geographical Information Science* 29(4):667–689. doi:10.1080/13658816.2014.996567
8. Ferrare J J, Apple M W (2015) Field theory and educational practice: Bourdieu and the pedagogic qualities of local field positions in educational contexts. *Cambridge Journal of Education* 45(1):43–59. doi:10.1080/0305764x.2014.988682
9. Finch K C, Snook K R et al (2016) Public health implications of social media use during natural disasters, environmental disasters, and other environmental concerns. *Natural Hazards* 83(1):729–

760. doi:10.1007/s11069-016-2327-8
10. Fang J, Hu J, Shi X, Zhao L (2018) Assessing disaster impacts and response using social media data in China: a case study of 2016 Wuhan rainstorm. *International Journal of Disaster Risk Reduction*
 11. Houston J B, Hawthorne J et al (2014) Social media and disasters: a functional framework for social media use in disaster planning, response, and research. *Disasters* 39(1):1–22. doi:10.1111/disa.12092
 12. Hughes A L, Denis L A et al (2014) Online public communications by police & fire services during the 2012 hurricane Sandy. Paper presented at the 2014 international conference on Human Factors in Computing Systems (CHI 2014). New York
 13. Ritchie H, Roser M (2014) Natural Disasters. Published online at OurWorldInData.org. Retrieved from: <https://ourworldindata.org/natural-disasters>. Assessed 23 October 2021
 14. Ihlen Ø. (2007) Building on Bourdieu: A sociological grasp of public relations. *Public Relations Review* 33(3): 269–274. doi:10.1016/j.pubrev.2007.05.005
 15. Kryvasheyev Y, Chen H et al (2016) Rapid assessment of disaster damage using social media activity. *Science Advances*. doi:10.1126/sciadv.1500779
 16. Kankanamge N, Yigitcanlar T et al (2020) Determining disaster severity through social media analysis: Testing the methodology with South East Queensland Flood tweets. *International Journal of Disaster Risk Reduction*. doi:10.1016/j.ijdr.2019.101360
 17. Mergel I (2013) Social media adoption and resulting tactics in the U.S. federal government. *Government Information Quarterly* 30(2):123–130. doi:10.1016/j.giq.2012.12.004
 18. Mergel I (2016) Social media institutionalization in the U.S. federal government. *Government Information Quarterly* 33(1):142–148. doi:10.1016/j.giq.2015.09.002
 19. Ngamassi L, Ramakrishnan T, Rahman S (2016) Use of Social Media for Disaster Management. *Journal of Organizational and End User Computing* 28(3):122–140. doi:10.4018/joeuc.2016070108
 20. Ouyang Z, Wei J, Xiao Y, Wang F (2017). Media attention and corporate disaster relief: evidence from China. *Disaster Prevention and Management: An International Journal* 26(1): 2–12. doi:10.1108/dpm-10-2015-0247
 21. Sallaz J J, Zavisca J (2007) Bourdieu in American Sociology, 1980–2004. *Annual Review of Sociology* 33(1):21–41. doi:10.1146/annurev.soc.33.040406
 22. Singh S (2019) Science, Common Sense and Sociological Analysis: A Critical Appreciation of the Epistemological Foundation of Field Theory. *Philosophy of the Social Sciences*. doi:10.1177/0048393118819823
 23. Sharp E N, Carter H (2020) Examination of how social media can inform the management of volunteers during a flood disaster. *Journal of Flood Risk Management* 13(4):1–10. doi:10.1111/jfr3.12665
 24. Stokes C, Senkbeil J C (2016) Facebook and Twitter, communication and shelter, and the 2011 Tuscaloosa tornado. *Disasters* 41(1):194–208. doi:10.1111/disa.12192

25. Umihara J, Nishikitani M (2013) Emergent Use of Twitter in the 2011 Tohoku Earthquake. *Prehospital and Disaster Medicine*28(05):434–440. doi:10.1017/s1049023x13008704
26. WangY, Taylor J E (2018) Coupling sentiment and human mobility in natural disasters: a Twitter-based study of the 2014 South Napa Earthquake. *Natural Hazards*92(2):907–925. doi:10.1007/s11069-018-3231-1
27. Wukich C, Mergel I (2015) Closing the citizen-government communication gap: Content, audience, and network analysis of government tweets. *Journal of HomelandSecurity & Emergency Management*12(3):707–735.doi:10.1515/jhsem-2014-0074
28. Xing Z, Zhang X et al (2021) Crowdsourced social media and mobile phone signaling data for disaster impact assessment: A case study of the 8.8 Jiuzhaigou earthquake. *International Journal of Disaster Risk Reduction*.doi:10.1016/j.ijdr.2021.102200
29. Yan L L, Pedraza-Martinez A J (2019) Social Media for Disaster Management: Operational Value of the Social Conversation. *Production and Operations Management*.doi:10.1111/poms.13064

Figures

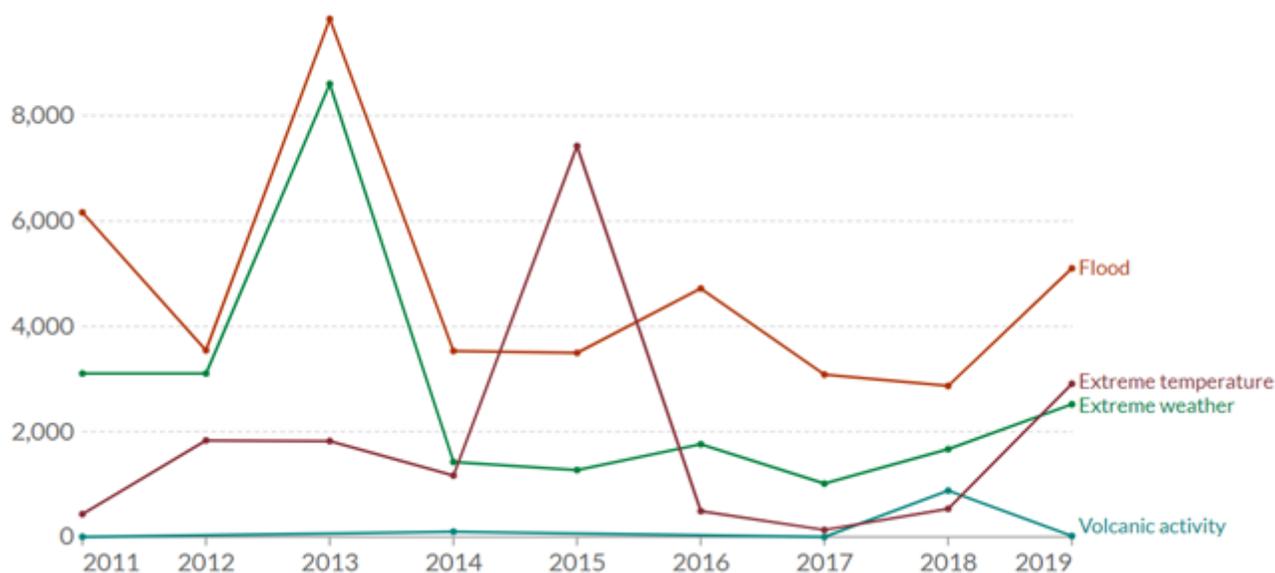


Figure 1

Global deaths from natural disasters, 2011 to 2019 (Hannah Ritchie and Max Roser, 2014)

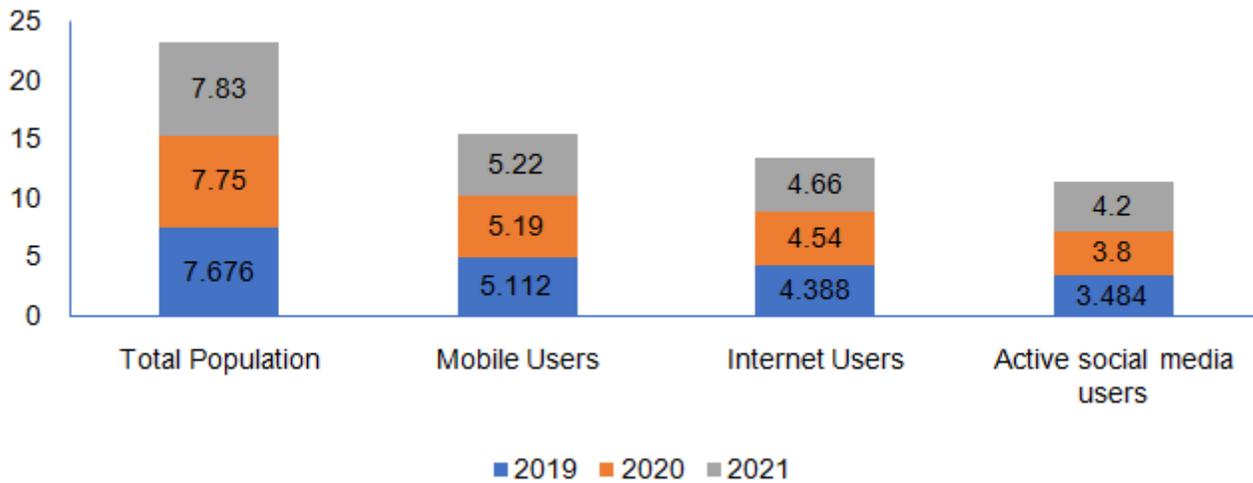


Figure 2

Comparison of digital basic data from 2019 to 2021

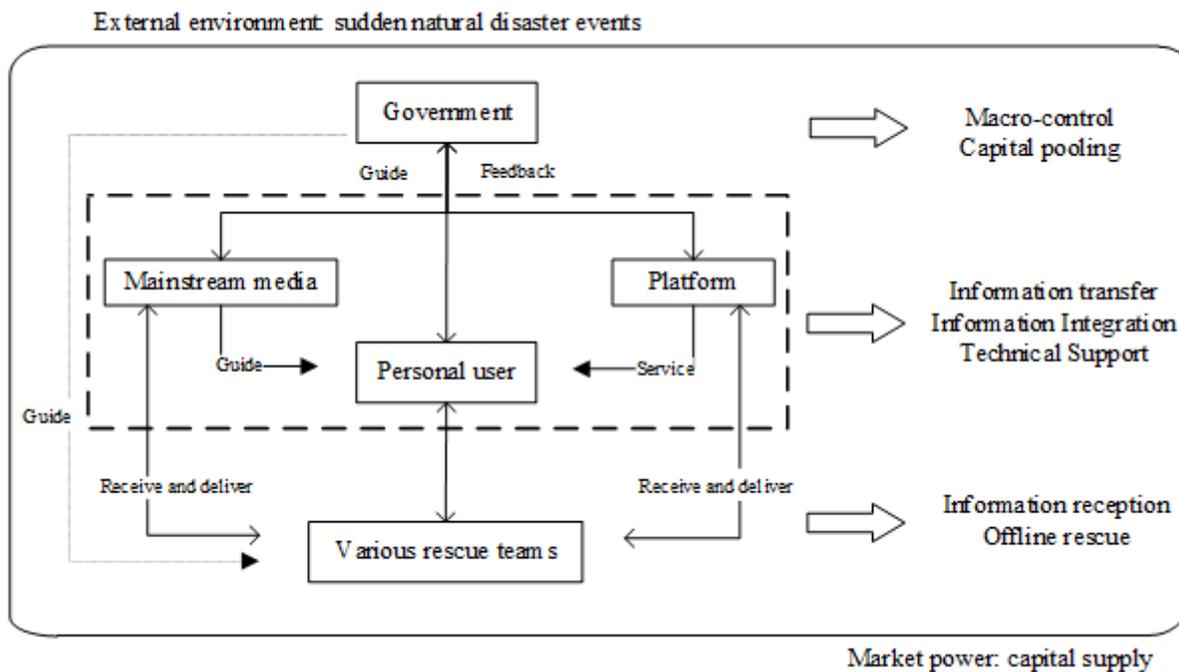


Figure 3

Graphical representation of social media fields under sudden natural disasters

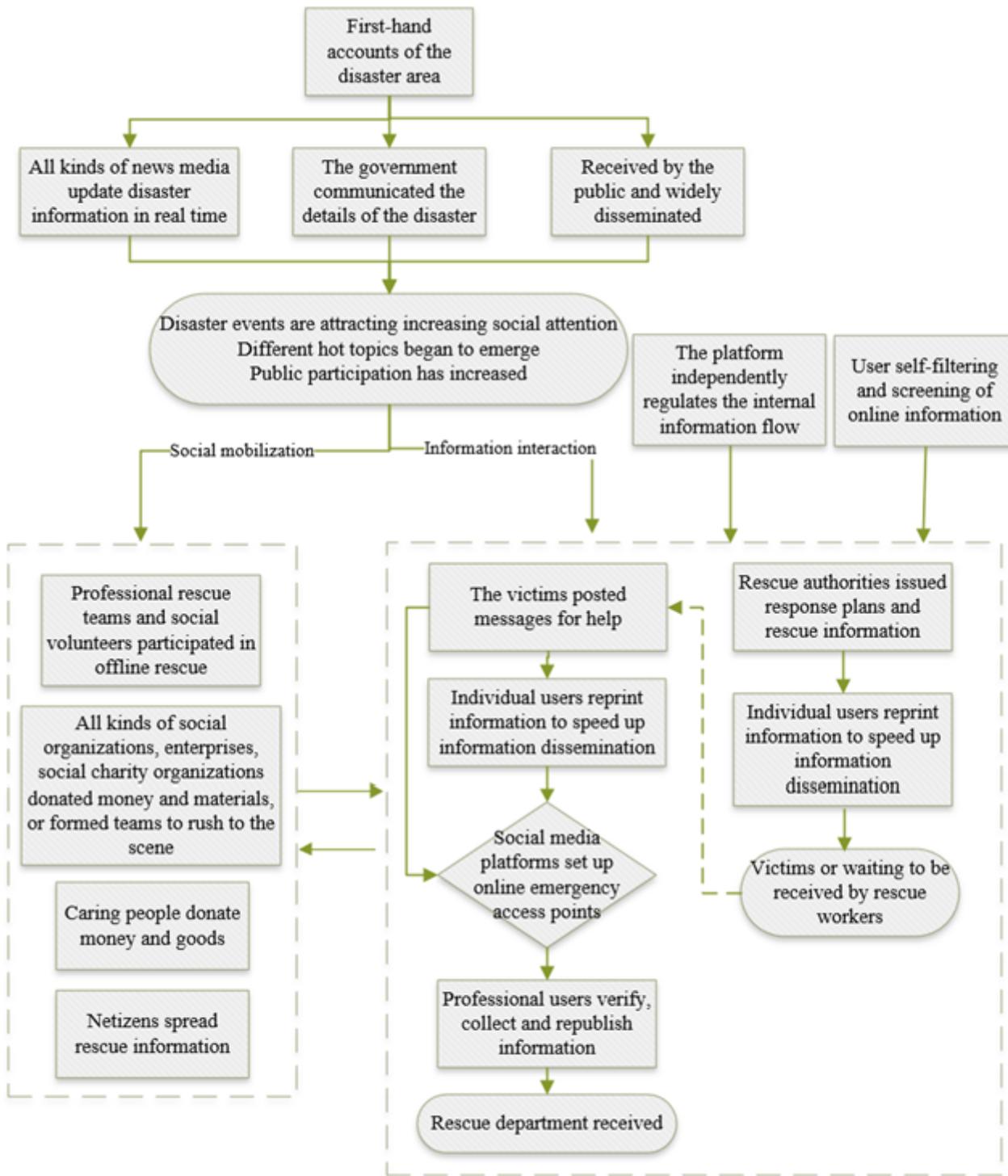


Figure 4

Operation mechanism of multi-subject online disaster relief