An Empirical Research on How to Tackle Infodemic in China: Stakeholders and Algorithms

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Abstract

Along with the COVID-19 pandemic, Infodemic has become a global concern. Compared with the relatively matured guidelines regarding the COVID-19 prevention and treatment, effective and standardized solutions towards the Infodemic are still lacking. With the ubiquity of social media in China, algorithm technology has been widely applied to many new media platforms and played a greater role in combatting COVID-19, especially misinformation and disinformation. Inspired by the model of "blocking the spread of the virus, treating the infected population, and improving immunity" for the prevention and control of the COVID-19 pandemic, this study examines three dominant forms of algorithm: collaborative filtering recommendation, content-based recommendation, and knowledge-based recommendation, and proposes BPI (block, push and intervene), a theoretical model that calls for timely blocking of misinformation and disinformation, precisely deliverying authentic information to people affected by the Infodemic and intervening in some potential issues in advance. Based on the BPI framework, this study adopts a semi-structured interview method to interview relevant staffs in charge of Bytedance, Tencent, Sina Weibo, Baidu, and The National Internet Information Office's Center for Reporting Illegal and Adverse Information, to summarize patterns of algorithms using against the Infodemic. Additionally, online panel survey is further used to obtain the public perceptions of the severity of Infodemic situation on each platform. By evaluating the cross-validated results of the survey sample and semi-structured interviews on the role of algorithms against Infodemic, this study contributes to the understanding of the working details and practices surrounding information epidemics in the context of China, as well as for the systematic research on the unique use of algorithms in the midst of public health crises.

Keywords

Digital governance, COVID-19, Infodemic, Internet platforms, Algorithm

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Chapter 1: Introduction

1.1 Research background and significance

From the end of 2019 to the beginning of 2020, the COVID-19 epidemic broke out in Wuhan, China. Its special strain and high contagiousness, and the lack of specific medicines in a short-term, worked together to accelerated its spread. Since January 21, the National Health Commission of China issued the first daily report of the epidemic, and it took only ten days (January 21-January 31, 2020) that the total confirmed cases surged from 291 to 11,791.

Meanwhile, the global COVID-19 epidemic has also shown a trend of multiple outbreaks. Italy, the United Kingdom, Japan, and other countries have witnessed a large-scale increase in confirmed cases. On March 21, 2020, the World Health Organization (hereinafter referred to as WHO) identified this COVID-19 epidemic as a global pandemic. As one of the most globalized countries--the United States, a large-scale outbreak of COVID-19 epidemic has started, the number of confirmed cases of COVID-19 worldwide has begun to rise on a large scale.

Given its seriousness, the digital space and Internet platforms are flooded with information about the epidemic, some of which are science-based, whilst some are false information or deliberately fabricated rumors. In the Internet age, the general public, facing the risk of epidemic infection and disorder in their normal lives, also have to face a large amount of information in the digital space, especially the impact of false information or rumors on their own perceptions. Regarding the prevention and control of the COVID-19 epidemic, all walks of life have reached a consensus. However, in the information field, the problems associated with the COVID-19 epidemic have not received widespread attention. The impact of the Infodemic on the physical and mental health of the public will also hinder the prevention and control of COVID-19 epidemic, which will result in the failure to fully implement the correct prevention and control measures for COVID-19. Therefore, the prevention and control of the Infodemic has practical significance for the prevention and control of the COVID-19 epidemic and the improvement of the physical and mental health of citizens, which constitutes the focus of this research.

1.3 Literature review

1.3.1 Research on the Infodemic

At present, research on Infodemic has existed at home and abroad, but the abroad started earlier and the research is more comprehensive. Global research on Infodemic can be divided into five categories: the definition of Infodemic, the specific manifestations of Infodemic, the impact mechanism of Infodemic, the formation mechanism of Infodemic, and the ways of responding to Infodemic. Domestic research is mainly about the overview of the Infodemic and the case analysis of the Infodemic.

1.3.1.1 Definition of Infodemic

When the SARS epidemic broke out in 2003, David Rotkopf (2003) first proposed

the concept of "Infodemic". The concept of Infodemic is a combination of the two terms, "Information" and "Epidemic". The WHO (2021) defines an Infodemic as an overload of information (some correct and some incorrect), which makes it difficult for people to find trustworthy sources of information and guidance to rely on, and may even harm people's health. The two main manifestations of Infodemic are misinformation and disinformation. The former emphasizes that errors in information are unintentional, while the latter is misinformation deliberately disseminated by users for various purposes.

1.3.1.2 The specific manifestations of the Infodemic

The specific manifestations of the Infodemic in the research community can be divided into the performance of the information itself and the performance of the public after it is affected.

For the former, researchers mainly adopted two research methods, social network analysis and content analysis. Gruzd & Mai (2020) analyzed a typical case of Infodemic by taking the spread of rumors on Twitter about "the COVID-19 epidemic does not exist" as an example, and concluded that in this Infodemic case, the main promoters are supporters of former US President Trump, and its proliferation is international, and similar remarks have also appeared on a large scale in Brazil. Gruzd & Mai's research introduced social robots into the research horizon of Infodemic. Similar to this study, Miyoung Chong (2020) analyzed the case of the Infodemic in South Korea, and the study found that the network community aggregates play an important role in the spread of the Infodemic.

The above-mentioned manifestations of the Infodemic have caused the public impact of the Infodemic through connection with Internet users. In terms of public influence, Cheng et al. (2020) studied the performance of different groups in anxiety and sleep disorders upon affected by the Infodemic using surveys, and constructed the relationship between the Infodemic and anxiety along with sleep disorders. The study found that audiences of different information consumption types have significant differences in anxiety and sleep disorders affected by the Infodemic. This study suggested that the type of audience should be taken into consideration in the management of Infodemic. Hence, it is practically necessary to adopt different methods of refuting rumors and information dissemination for different types of audiences.

1.3.1.3 The formation mechanism of the Infodemic

In the research on the formation mechanism of the Infodemic, Grimes (2020) endowed false information with a viral nature. Grimes (2020) argued that vague statements about the truth often went viral easily on the Internet, and each of us is a rumor carrier. Grimes (2020) argument closely links the spreading mechanism of the Infodemic with the spreading mechanism of the COVID-19 epidemic, and provides a familiar concept reference for understanding the Infodemic. Moreover, Fang (2020) suggests that the double loss of information order at the top-down and bottom-up levels is the root cause of the worsening of the "trust epidemic." This understanding helps researchers to understand the Infodemic from the perspective of disorder.

1.3.1.4 The impact mechanism of the Infodemic

Regarding the impact mechanism of the Infodemic, many scholars have borrowed existing theoretical models for analysis. Greenspan and Loftus (2020) analyzes why the Infodemic has a profound negative impact on the public from the influence of audience memory. This research treats the Infodemic more as a continuous process, and each stage of the Infodemic will become the foreshadowing of the next stage of the Infodemic, leading to the continuous increase of the Infodemic under the condition of lack of governance. Agarwal & Alsaeedi (2020) used the information behavior framework to analyze the mechanism of the impact of Infodemic on the public. This research incorporates the production, consumption and audience perception of information into the research scope of the Infodemic, and provides a reference for research perspectives to consider the response strategies of the Infodemic.

1.3.1.5 Responses to the Infodemic

In November 2020, the World Health Organization issued the first edition of the Infodemic management training handbook, which mainly analyzed how practitioners in the medical industry and epidemic prevention & control personnel should respond to the Infodemic from the perspective of risk communication and rumor management. However, the handbook does not propose an overall action framework for reference. It is more a summary of existing research in the academic world, with a stronger science and education nature.

In the academic sector, the most representative one is Pnina et al. (2020) that discusses the possible role of information and communication technology (ICT) in the management of Infodemic in the form of a review. Harris (2020) did the research from the perspective of jurisprudence on how to use laws to regulate Infodemic, and the trade-offs between managing Infodemic and maintaining freedom of speech.

Other research on the Infodemic response approaches can be divided into two categories, case analysis and strategy suggestions.

Zheng (2020) took four platforms, namely Toutiao, Weibo, Tencent News, and Dingxiang Doctor as examples, to descriptively show the number of rumors released and reads of these four platforms in the early stages of the epidemic. The research of Chen Huaming (2020) takes China’s five major anti-rumor subjects, China Internet Joint Rumor-Refusal Platform, Tencent “Jiaozhen”, Weibo Anti-rumor, Baidu Anti-Rumor, and Toutiao Anti-rumor as the main research subjects, and analyzes the relationship between the amount and geographic area of these subjects' anti-rumor information. The choice of the subjectives of the research is enlightening for this research. These five main bodies have basically constructed the main components of China's Internet Infodemic management system.

In terms of strategic suggestions, scholars in the fields of journalism & communication and information management have mainly contributed macro-level suggestions. Ding Botao (2020) proposed that artificial intelligence technology can be applied to epidemic information management, and Fang Xingdong (2020) emphasized the main responsibility of the platform and the cooperation of multiple subjects from

the perspective of social governance. Scholars in the field of information science have provided a reference for algorithm innovation in response to Infodemic from the perspective of algorithms. Liu Kan and Huang Zheying (2020) proposed an epidemic rumor recognition based on text augmentation and generative adversarial network (GAN) method.

At present, only in WHO's "COVID-19 Situation Report-100", the author mentioned the WHO's EPI-WIN framework, which collects global digital media usage data every week to predict potential risks. However, EPI-WIN is still the WHO's own behavior. It has not incorporated more Infodemic management subjects into the framework, and has not been widely used in actual global Infodemic management.

1.3.2 Algorithms and Information Dissemination

The research on algorithms and information dissemination can be divided into two main categories at present, the research on the operating mechanism of algorithms in the field of information dissemination, and the research on the social influence of algorithms participating in information dissemination.

In the first type of research, the research by Xu Hailing et al. (2009)] is the most representative. The research classified Internet recommendation systems in detail, and divided the existing recommendation algorithms into four categaries, content-based recommendation, collaborative filtering recommendation, knowledge-based recommendation and combined recommendation. The research on the classification of recommendation algorithms is of great reference to this research. The three types of recommendation systems, content-based recommendation, collaborative filtering, and knowledge-based recommendation can be applied to each link of information dissemination, and the combined recommendation algorithm is a combination of these three recommendation methods. In a sense, it is a holistic thinking that runs through the entire process of information dissemination and even Infodemic management.

In the second type of research, Jieun and Thomas (2020) took vaccine hesitation as the main object and studied the relationship between the algorithm recommendation on the Amazon platform and the frequency of vaccine hesitation-related books. The novelty of this research pertains to the connection of the awareness and diffusion of vaccine hesitation among the public with the recommendation ranking of algorithms, and establishing an organic connection. These studies inspired scholars in this vein to pay attention to whether the Internet platform effectively interfered with the vaccine hesitation problem in the middle and late stages of the epidemic.

In terms of audience influence, Cui and Wu (2019) conducted a survey on the usage of Toutiao users and found that the algorithm-driven Toutiao can effectively increase users' knowledge of public affairs and soft news, and explored the role of gender in it as a mediation effect. The first finding of the research also reflects in a sense that an algorithm-driven content distribution platform similar to Toutiao can participate in the governance of the Infodemic by increasing users' knowledge of public affairs by spreading more correct information and suppressing the generation of false perceptions.

By reviewing the literature in the two major areas of Infodemic and algorithms, it can be found that the current research in the field of Infodemic management has reached

a certain scale. Scholars have a relatively deep understanding of the definition, source, and development history of Infodemic. In terms of response strategies to the epidemic, most studies are either depthless or single case-driven, lending an inadequacy in systematic understanding of the response strategies of the Infodemic. Against the backdrop that the Infodemic is still spreading in many countries, it is of great practical significance to use China's experience as a model to summarize the systematic response strategies of the Infodemic, especially in the era of intelligent communication.

1.3 Research questions

As a large-scale Infodemic occurs in the Internet space, and the government, the Internet platforms, and other entities have their own responsibilities for the identification and processing of information. As artificial intelligence algorithms have become an important technical tool for Internet platforms, the core research questions of this study are as follows.

RQ1: During the COVID-19 epidemic, how was China's Infodemic prevention and control system composed?

RQ2: How does the algorithm play a role in this prevention and control system?

Since the academic community has not yet formed a preliminary understanding of China's response to the Infodemic, it deems imperative to anchor the basic framework and experience of China's response to the Infodemic by China's accomplishment. This study starts from the BPI model proposed by this article originally and compares the severity of Infodemic in specific epidemic stages between China and other countries, so as to determine China's achievements in global Infodemic governance. Furthurmore, this article analyzes the composition of China's Infodemic prevention and control system, as well as users' perceptions.

1.4 Research methods

As the proposed research questions are relatively complex, which involve multiple subjects, and the academic community has not yet formed a more scientific research framework or model, this research attempts to propose theoretical models for reference based on the characteristics of the COVID-19 epidemic, the Infodemic, and the algorithms. Furthermore, this study used a mixed-method approach, integrating in-depth interviews and surveys, to demonstrate theoretical models and conduct a comprehensive and in-depth analysis of the basic mode of China's response to the Infodemic.

In the in-depth interview, this study referred to the five research objects selected by Chen (2020). However, considering the similarity of Baidu and Toutiao’s software functions and the lack of the Baidu platform’s own secondary dissemination function, this study chose the Central Cyberspace Administration of China’s Illegal and Bad Information Reporting Center (the organization of the China Internet Joint Rumor Refusal Platform), Tencent Jiaozhen, Sina Weibo and Toutiao as main objects. The interviewees consists of those responsible for the anti-rumor works of the four main bodies.

Since there is no complete and clear framework for understanding the issue of Infodemic governance, this study chose the form of semi-structured interviews, hoping to obtain the status of each subject's participation in Infodemic governance under the existing cognitive framework, and to obtain more available information for these subjects to participate in the governance of the Infodemic under the semi-structured model. The topics of each interview are about 12, and the average interview time is about 45 minutes. The interview questions mainly revolved around two themes: the working mode of participating in Infodemic governance during the COVID-19 epidemic, and the role and operating mechanism of algorithms in Infodemic governance. From March 2 to March 28, 2021, this research conducted interviews with the four aforementionedinterviewees The analysis of the in-depth interviews is exhibited in Chapter 3.

In order to gain a deeper understanding of the differences in user perceptions caused by the differences in the Infodemic response measures of various platforms, this study conducted a questionnaire survey on Tencent, Sina Weibo, and Weibo. Toutiao users to investigate their perceptions of the Infodemic when using these platforms during the epidemic. This survey can better evaluate the various measures in response to the Infodemic. For the convenience of sample collection, this study adopted a snowball sampling method while taking into account the characteristics of province and age, and selected respondents of different provinces and ages as the starting point for the snowball sampling. The questionnaire cosists of 25 items, including the basic demographic information of the respondent and the use of the Internet platform. For the three Internet media platforms of WeChat, Weibo, and Toutiao involved in the interview, this study utilizes items with 7-point Likert-scales to measure the respondents' usage and perception of the Infodemic. The specific analysis will be shown in the fourth chapter of this article.

Chapter 2 Model Setting: BPI Model

Due to the insufficiency of systematic and theoretical research on Infodemic governance, this study hopes to innovatively propose a feasible theoretical framework, the BPI model, based on China's dual experience in dealing with the COVID-19 epidemic and the Infodemic. Further, this study hopes to illustrate China's Infodemic prevention and control system and its effects with the help of this model.

2.1 Model source

According to China's "COVID-19 Prevention and Control Plan (7th Edition)", China's main prevention and control modes for blocking the spread of the COVID-19 epidemic can be summarized as follows, blocking the spread of the virus, treating infected people, and improving immunity of the public. Facts have also proved that China's COVID-19 epidemic prevention and control model is extremely effective. WHO's representative in China, Gauden Galea, also affirmed China's experience in epidemic prevention and control, and believes that this model is useful for the global COVID-19 epidemic. All prevention and control measures are of reference significance.

As for the Infodemic, does this model have reference significance as well? In combination with the Infodemic situation, the digital media and social media of the Internet platform are the concentrated areas of the Infodemic. Therefore, thinking about the governance path of the Infodemic should also incorporate the operating characteristics of the Internet platform itself. As producers and distributors of information, China's Internet platforms use algorithms extensively in the process of information dissemination, and allow algorithms to play the role of gatekeeper. As mentioned in the first part of this research, Xu et al. (2009) summarized three types of recommendation algorithms, which correspond to the three major parts of the COVID-19 epidemic prevention and control model.

Collaborative filtering recommendation can use information feedback that appears in a group of similar interests as the basis for whether the information is delivered to other users in the group. Specifically, in a specific content section, if there is a rumor and it is reported by the user, the algorithm will judge it as low-quality content, reducing the number of times that the content is recommended to other users who follow the section, thereby blocking the spread of rumors. Content-based recommendation is to recommend related content to users based on the user's browsing history. Taking rumors as an example, it is possible to distribute the content of the rumors to users who have seen the content of the rumors, thereby reducing or eliminating the impact of existing rumors on users. Knowledge-based recommendation is to recommend specific knowledge produced by experts or professionals to users who are interested in the field of knowledge, so that scientific knowledge on COVID-19 prevention, vaccination and other related issues can be recommended to users who are concerned about the COVID-19 epidemic. In this recommendation model, if the production of scientific knowledge is advanced before the generation of rumors, then users can be well given the ability to use scientific knowledge to resist the influence of rumors.

Regarding the participants in the governance of Infodemics, Liu and Liu (2012) mentioned in the "Multiple Subject Structure of Internet Rumor Governance in the Context of Good Governance" that the governance body of the multiple co-governance of Internet rumors consists of three parts, government as the dominance of the good governance of Internet rumors, the public as the foundation, and non-governmental organizations as the link in the structure. Although online rumors are not equivalent to the Infodemic, they are only an important factor and component of the Infodemic, but the main body of online rumor management and the main body of Infodemic management are homogenous to a certain extent. This study argues that in the specific situation of Infodemic governance, because Internet platforms are at the center of information dissemination, they play an irreplaceable role in the spread and governance of Infodemics and are an important part of non-governmental organizations. Then, this study defines three types of participants in Infodemic management. government departments, Internet platforms, and Internet users.

Therefore, this study posits that China's COVID-19 epidemic prevention and control model and the three models of the algorithm recommendation system can be combined into a basic model or framework for Infodemic management. We coin and term it as BPI (Block-Push-Intervene) model, which means blocking the spread of rumors and false information, pushing rumors and true information to users affected by the information and distributing scientific information to users to enhance their immunity to Infodemics. The schematic diagram of the model is exhibited in Figure 2.1.

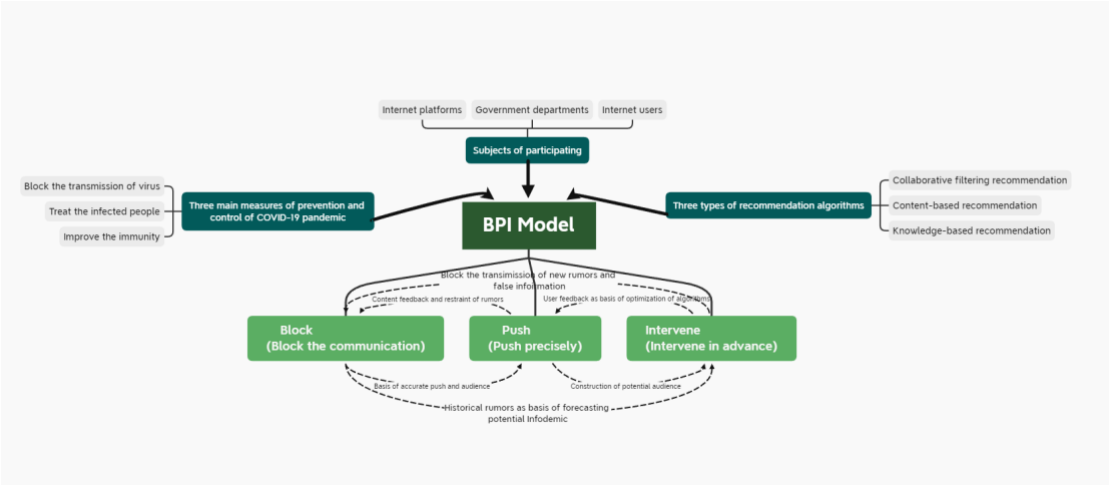

Figure 2.1 Schematic diagram of BPI model

2.2 Model Explication

For this model, two points warrant special explanation. First, this is not a linear model, because neither the epidemic nor the information dissemination itself is linear, hence, it is inappropriate to use a linear model to deal with the Infodemic. The three links of the model can form an organic interaction and mutual promotion relationship.

Specifically, in the "Push" section, the important basis for its content and audience selection is the rumors and false information selected in the "Block" link and their

readers, so the "Block" link contributes to the "Push" link with certain content and audience selection basis. In the process of "Push," users can also give feedback on the content of refuting rumors because the understanding of scientific knowledge is always a gradual process, not all the content of refuting rumors is completely scientific and authentic. The feedback of the rumor-refuting content can be filtered through collaborative filtering to determine whether it should be recommended and disseminated, so as to prevent the large-scale dissemination of the rumor-refuting information, which is the "Block" in this model.

In the "Push" link, the algorithm not only distributes the content of rumors to users affected by the Infodemic, but also establishes a focus group that is vulnerable to the Infodemic based on a large amount of data. This group can be used as one of the main target audiences in the "Intervene" link. The user feedback of the content in the "Intervene" process has also become the basis for re-screening the target audience for accurate push, and these feedbacks have become the basis for algorithm optimization. This also shows that there is an interactive effect between the "Push" and "Intervene" links.

After the rumors and false information identified in the "Block" stage are accumulated to a certain amount, the basic development process of the COVID-19-related Infodemic can be basically constructed. This process can be used as a basis for inferring what content is needed in the "Intervene" stage. On digital media and social media platforms, content producers are not only authoritative organizations, but also user-generated content (UGC). Due to the uneven level of content publishers, UGC provides an important breeding ground for the circulation of false information and rumors. Therefore, in the "Intervene" link, false information may interfere with user cognition and judgment in advance, and collaborative filtering can also participate. In this process, the Infodemic in the early intervention stage is blocked, that is, the two links of "Intervene" and "Block" are also mutually promoting.

The second point that warrants explanation is that, although the proposal of the BPI model is based on the three major measures for the prevention and control of the COVID-19 epidemic, it does not mean this model only has reference significance for the information related to the COVID-19 epidemic. In fact, the BPI model can also be applied to other types of Infodemics. To control false information and rumors related to any issue, it is necessary to first block the spread of such information, disseminate correct information to the injured group, and take further measures to intervene in advance to prevent similar Infodemics. This model also fits the existing research findings of public relations.

In a nutshell, the BPI model is based on the juxtaposition and integration of the three types recommendation algorithms and the three major measures for the prevention and control of the COVID-19 epidemic. The three main bodies of Internet platforms, government departments, and Internet users are included to block the transmission, push information to users accurately, and intervene in advance. The interrelated steps are the main framework, which is applied to algorithm-participated Infodemic management.

The BPI model provides an integrative perspective for dealing with the Infodemic.

Compared to other models related to the governance of rumors on Internet platforms, the BPI model can help better understand the agents involed in the process of combating Infodemic and the role of technology. And the elements in the governance are organically connected and interacted.

According to the BPI model, this study also provides a preliminary answer to RQ1: China's Infodemic prevention and control system is led by the Office of the Cyberspace Administration of China and other government departments, in conjunction with Internet media platforms such as Tencent, Sina, and Toutiao. Internet user reports are important clues of rumors or false information, and a multi-agent interactive prevention and control system is introduced for verification by experts in related fields.

Chapter 3 The Composition and Strategic Choice of China's Infodemic Prevention and Control System

Regarding the composition and strategy selection of China's Infodemic prevention and control system, this study utilizes the approach of in-depth interview in accordance with the framework of the BPI model, to understand how each component prevents the spread of rumors or false information during the epidemic, pushes true information, and intervenes in advance. This study focuses on the role of algorithms in it, so as to build the composition and strategic choice of China's Infodemic prevention and control system.

3.1 Overview of each subject

Through in-depth interviews, this study summarized the basic mode and overview of the main components of China's Infodemic prevention and control system to deal with Infodemics, as shown in Figure 3.1.

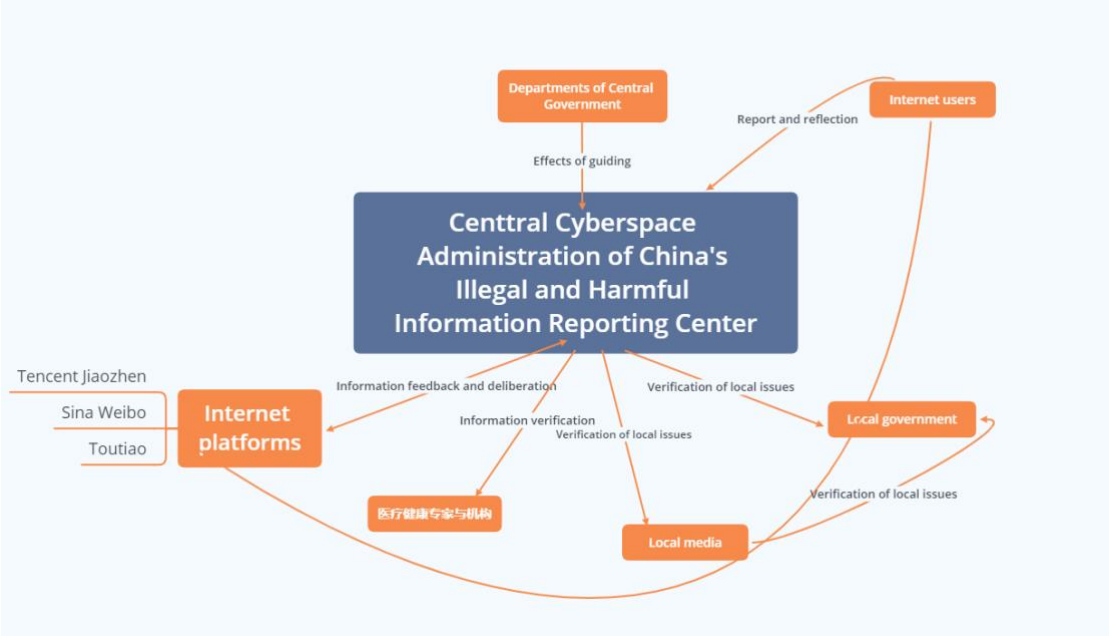

Figure 3.1 Overview of each subject in China's Infodemic prevention and control system

3.1.1 Central Cyberspace Administration of China's Illegal and Bad Information Reporting Center: the center of the prevention and control system

Under the guidance of 32 national ministries and commissions, the Reporting Center has established a very close cooperative relationship and information access mechanism with various government ministries and commissions, which facilitates the dissemination of authoritative information and the verification of false information. Internet platforms represented by Tencent, Toutiao, Baidu, and Sina Weibo are all cooperating units of the China Internet Joint Rumor Refusal Platform established by the Reporting Center, while People's Daily Online, Xinhua Net, and 20 provincial-level rumor-refuting platforms are all member units of the joint anti-rumor platform. The

joint rumor rejection platform established by the Reporting Center is equivalent to establishing an intermediary bridge between the central and local governments. The transmission of central information to the localities, the feedback of local information to the central government, and the verification of information involving both parties on the Internet platform can all be carried out on this platform.

The Reporting Center's rumor rejection mechanism mainly cosists of four components: discovery, verification, rumor refutation, and dissemination. The schematic diagram is shown in Figure 3.2.

Figure 3.2 Schematic diagram of the Reporting Center's rumor rejection mechanism

In the discovery link, the Reporting Center has three sources of information: Xinhua Net's big data service which assists the Reporting Center to obtain rumors and public opinion trends, the Reporting Center's 12377 hotline and the United Rumor-defying platform website which accepts individual reports from netizens, and the member units in the above organizational structure which report the rumors and false information to the Reporting Center.

In the verification link, the Reporting Center plays the intermediary role of the joint anti-rumor platform, and verifies rumors and false information through two channels, upward and downward. The schematic diagram is displayed in Figure 3.3.

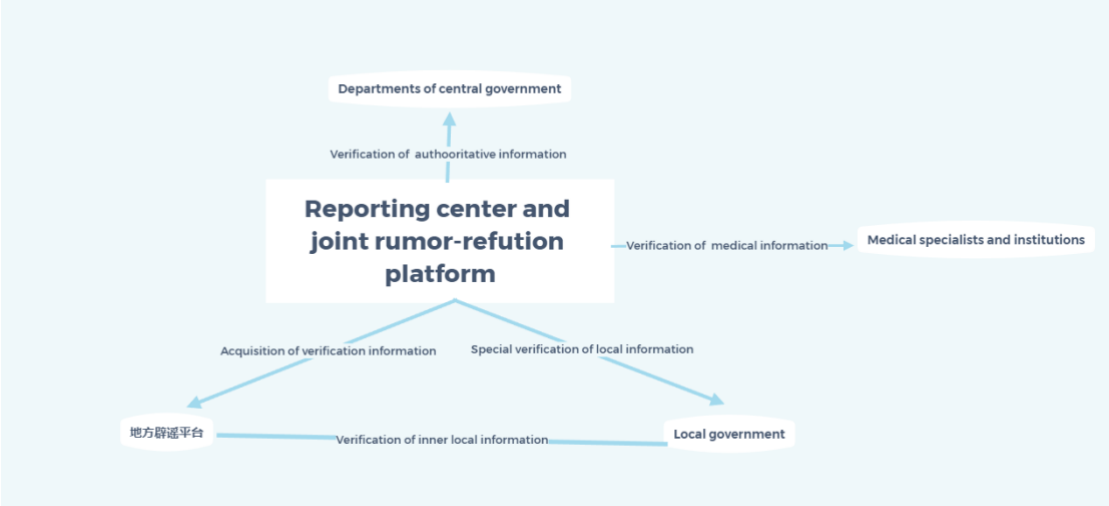

Figure 3.3 Schematic diagram of the upper and lower dual-channel verification of the Reporting Center

In the process of refuting rumors, the Reporting Center refutes false information or rumors verified on the joint rumor-refuting platform and releases true information. In the process of contact and verification, the Reporting Center itself produces a certain

amount of anti-rumor content, and processes some authoritative releases as new anti-rumor content on the joint anti-rumor platform.

In the communication link, the joint anti-rumor platform itself serves as the platform for the dissemination of rumor information. However, subject to the size of its audience, the Reporting Center also cooperates with its partner units to publish its anti-rumor content on Internet platforms such as WeChat, Weibo, and Toutiao to maximize the scope of dissemination, in order to more comprehensively reach Internet users who may be affected by rumors and false information. In particular, the Reporting Center requires Internet platforms to recommend content that involves sudden and certified content, namely, to rank higher in the information flow or recommendation flow.

In terms of international cooperation, staffs of the Reporting Center mentioned that the Reporting Center has set up an international cooperation office to participate in the management of rumors and false information in the international field. However, during the COVID-19 epidemic, the Reporting Center did not establish cooperation with other countries or related organizations in managing the Infodemic.

In summary, the working model of the Reporting Center is a reflection of the basic framework of China's Infodemic governance; in other words, government departments and Internet platforms have their respective advantages of authority and strong dissemination, and are jointly committed to the governance of Infodemics.

3.1.2 Tencent Jiaozhen: a representative platform for accurate push

Tencent Jiaozhen was first established in November 2015. It not only reaches users, but also serves various content-based products within Tencent's entire product group to achieve greater influence.

When it comes to discovering, verifying, and refuting rumors and false information, Tencent has adopted a human-machine collaboration approach.

In terms of the discovery of rumors, Tencent accepts user reports on the one hand, on the other, it also searches the entire network for possible rumors or false information clues. In addition, various content-based products under Tencent have feedback interfaces for rumors or false information that are connected to Tencent's Jiaozhen.

Regarding the verification of rumors, for unknown rumors, Tencent Jiaozhen used its professional verification team and verification capabilities to verify the problems with the rumor or false information. For known rumors, Tencent Jiaozhen’s algorithm system can automatically investigate and deal with the rumors and feed back authentic information to users.

In terms of rumor refutation, Tencent Jiaozhen published all verified content on the homepage of Tencent's rumor-refuting platform, and uses algorithm technology to accurately push the dispelled content to users who have been exposed to the content of the relevant rumors through the WeChat dispelling assistant.

It is particularly worthy of attention that Tencent's report feedback system has introduced a large number of algorithm technologies to provide users with a better report feedback experience. There are three functions in the micro program of Jiaozhen.

The first is that the user can search all the content that has been refuted by Jiaozhen. In other words, all the verified content has been "stored in the database." Users participate in Q&A by submitting clues of rumors, and Tencent staff will follow up on

the submitted clues. For users who are reluctant to use the search function, they can directly communicate with the Jiaozhen robot, such as submitting keywords, and the Jiaozhen robot will search for the verified content from the historical data. The operating logic of the Jiaozhen robot is a combination of content-based recommendation and knowledge-based recommendation.

It can be seen from the interviews that Tencent Jiaozhen has consciously applied the algorithm to the interception of rumors and the accurate push of rumor-defying content. The algorithm-driven "Jiaozhen robot" improves the efficiency of user reporting and efficiently collects information about the epidemic situation. It partially realized the function of dispelling rumors, while the "Rumor Refuting Assistant" completely realized the accurate dispelling of rumors to groups affected by the Infodemic, reducing the problem of information redundancy caused by large-scale dissemination, and improving the accuracy and effect of dispelling rumors.

3.1.3 Sina Weibo-Partial Ignorance of the Function of Algorithms

During the COVID-19 epidemic, Weibo first established a cooperative relationship with relevant departments and professional institutions. For rumors that have been verified, Weibo refutes rumors according to the difference between the original posting and reposting, large influence and small influence, and adopts different processing methods. The original content with greater social influence will be rejected in the processing of labelling, the original content with less social impact will be directly deleted from Weibo to refute rumors. Under normal circumstances, Weibo rumor rejection will not delete or tag the reposted content. The Weibo rumor rejection staff calls it "grasp the big and let go of the small" work method to adapt to the heavy tasks pressure. After the rumors or false information have been verified, the rumors occurred on Weibo will be summarized once a day, and then the content of the rumors will be pushed to all Weibo users through private messages.

Compared with WeChat's approach to dispel rumors, Weibo's way of dispelling rumors is not quite precise. When interviewed, Weibo's anti-rumors staff suggested that the Weibo anti-rumor team had discussed this issue before, but they believed that on the one hand, the number of rumors or false information was too large, and the rumors or falsehood information is changing anytime and anywhere, and widespread dissemination of rumors may be more effective. On the other hand, the amount of rumors or false information is inherently large, and if it is pushed backwards and accurately, it may arouse users' disgust.

As a social platform, there are also a certain scale of social robots that are machine accounts controlled by humans to automatically publish content based on specific keywords in batches on Weibo. When dealing with social robots in the Infodemic related to the COVID-19, Sina Weibo is mainly filtered through the underlying algorithm mechanism.

Sina Weibo accounts can be divided into certified and non-certified accounts. Certified users enjoy a higher priority in the recommendation system, so the information they publish also has greater social influence. In order to prevent authenticated users from publishing rumors or false information, which may cause severe social impact, Sina Weibo has established a credit score mechanism. That is, if

an authenticated user publishes a rumor or false information, upon verification, a certain credit score deduction would be applied, the user's priority in the recommendation system would be lowered.

Sina Weibo also adopted user education in response to the Infodemic. That is, for users who posted rumors or false information and those made malicious comments, their Weibo accounts will be blocked, and they will not be able to post within three days. After that, the blockade can be lifted if the user answers three questions correctly, and they will be informed of the reason for the ban. The effect of education improves users' self-consciousness and prudence in speaking under the Infodemic.

In September 2020, Sina Weibo has established a cooperative relationship with the China Association for Science and Technology, proposing to spread science on a new round of epidemics and vaccine-related issues that may break out in winter.

In summary, when Sina Weibo participated in Infodemic management, it mainly used manual discovery and verification of rumors, and adopted a large-scale dissemination method for the dissemination of rumors while failing to perform accurate push like Tencent does. Although the Weibo anti-rumor team argued that accurate push to users exposed to rumors or false information may disturb them, this research posits that pushing all the anti-rumor content of the day beforehand could bring information redundancy to users. Regarding the choice of accurate push, this research discusses further in the summary part of the interview and in the questionnaire survey.

3.1.4 Toutiao--a model of in-depth algorithm participation

Toutiao's anti-rumor work is mainly divided into two parts. The first is to participate in the management of rumors and false information, to reduce the risk of rumors and false information, and to limit the amount of these contents. The second is to actively do science and anti-rumor columns and conduct special anti-rumor campaigns for middle-aged and elderly people, and encourage health authors to produce anti-rumor and health science content.

In terms of the working mechanism of participating in the management of the Infodemic, Toutiao first discovers rumors and false information through back-end monitoring and receiving user reports, and then contact professional authors on the site, Bytedance's own medical team or external medical health experts to verify these information. For information that has been confirmed as rumors or false, Toutiao will directly remove it to prevent the information from further spreading. Furthermore, Toutiao will accurately push the content of refuting rumors to users.

Similar to Tencent's precise push mode, Toutiao pushes related rumor-defending articles to users who have been exposed to the content of the rumors. These articles will be pushed to users in the form of application notifications, mobile phone pop-ups, or recommendation streams (information feeds). The form of push is contingent upon the social influence of the specific piece of rumor or false information.

Specific to the application of the algorithm, Toutiao applies the algorithm to the three stages of discovery of rumors or false information, refutation of rumors, and early intervention. Toutiao's algorithm uses NLP (Natural Language Processing) technology to make a preliminary judgment on whether the content is rumor or false information based on the popularity of the content and user feedback, and put it into the manual

screening library. If a rumor is verified to have reappeared, the algorithm will automatically match and remove it in the rumor database, completely free from human involvement. In addition to using NLP technology to identify textual rumors or false information, Toutiao also uses OCR (text recognition) technology to search rumors and false information contained in pictures, and uses STT (speech-to-text) technology to analyze video content. Through utilizing these three technologies, Toutiao can apply algorithms to identify rumors in various forms of information such as text, pictures, and videos.

In the process of dispelling rumors, users' historical reading data of rumors will become an important basis for accurate push. Choosing push methods of different strengths according to the severity of the rumors will also ensure the effect of dispelling rumors and reduce the interruption to users. For the daily production of rumor and popular science content, Toutiao's algorithm will automatically include it in the recommendation stream based on the classification and quality of these content, and naturally recommend it to those in need. The content that is particularly high-quality or that the anti-rumor work team believes needs to be disseminated will be given a higher recommendation weight in the information flow.

According to the development stage of the COVID-19 epidemic, Toutiao recognizes in advance that the launch of the vaccine will become a possible Infodemic outbreak point, so it collects vaccine-related science knowledge in advance and pushes it to users in the information flow through the above methods, and pays special attention to the authenticity of vaccine-related information, and further conducts verification and refutations of rumors.

In a nutshell, Toutiao and Weibo both rely on algorithms to identify rumors and false information that involve social robots.

For users with higher ratings and stronger dissemination on the site, Toutiao also uses the above-mentioned recommendation weight adjustment method. If the algorithm captures that rumors or false information have been posted, the account's reccomendation weight will be flagged and reduced.

3.2 Summary of China's Infodemic Prevention and Control System

In order to display the results of the interviews more intuitively and concisely, Table 3.1 is developed, from the six perspectives of rumor identification, rumor verification, dissemination blocking, rumor rejection methods, early intervention, and algorithm participation.

Table 3.1 Summary of interview results

Rumor-refuting mechanism/Platforms	Reporting Center	Toutiao	Tencent Jiaozhen	Sina Weibo
Rumor Identification	1、 Receiving reports from users through 12377 and Joint Rumor-refuting Platform. 2、 Xinhua Net's big data service.	1、 Receiving reports from users. 2、 Using algorithms to identify content of which the comment area filled with keywords like "Fake News". 3、 Comparing reappearingrumors or false information with the datebase of rumors and identifying them automatically.	1、 Receiving reports from users. 2、 Searching possible rumors or false information manually all over the Internet. 3、 Accessing to the feedback API of all content-based products belonging to Tencent.	1、 Receiveing reports from users. 2、 Checking hot content manually. 3、 Cooperating with professional rumor-refuting institutions and endowing them with necessary ability.
Rumor Verification	1、 Inquering central government apartments for detailed policy information. 2、 Communicating with local government to verify the detailed polices. 3、 Verifying information	1、 Contacting the central government apartments, local governments and professional institutions to verify the content. 2、 Establishing medical team for information	1、 Verifying with the assistance of Tencent Medicine. 2、 Seeking confirmation from the cooperative specialists and experts.	1、 Establishing communication channel with central government apartments to verify contents. 2、 Seeking confirmation from professional medical institutions.

Continued from previous table

	related to the medical field with cooperative units.	verification after the outbreak of pandemic.		
Blocking Communication	It don't have the raight to determine how to deal with rumors or false information. But it hopes that Internet platforms could delete the content with terrible influence and label the confusing content.	1、 Deleting verified rumors or flase information. 2、 Including verified content in the database of blocking words. 3、 Reducing the weight of recommendation of accounts which used to disseminate rumors or false information.	1、 Labelling the verified rumors or false information. 2、 Banning the accounts which disseminate rumors or false information on purpose.	1、 Increasing the weight of authoritative media in the algorithm of recommendation. 2、 Deductingthe credit score of accounts which disseminate rumors to limit its communication channel and ability. 3、 Labelling rumors or false information with strong social influence and deleting those content with weak influence.
Methods of Rumor-refuting	1、 Disseminate rumor-refuting content on Internet platforms like Wecht, Weibo and Toutiao with different weights of promotion according to the importance of the content. 2、 The joint fumor-refuting platform disseminates	1、 Pushing rumor-refuting articles to users who have seen the rumors in Toutiao's information stream according to the data of users' browsing. 2、 Pushing rumor-refuting content with great social influence	1、 Disseminating rumor-refuting content on the home page of Tencent Rumor-refuting Platform. 2、 Pushing rumor-refuting content to users who have seen the romors through Rumor Rufuting Assistant of Wechat.	1、 Pushing rumor-refuting content to all the Weibo users through private messages. 2、 Disseminating rumor-refuting content on Weibo rumor-refuting account. 3、 Disseminating rumor-refuting content in cooperation with other accounts of Internet police.

	self-produced content or reposts content produced by other platforms.	through smartphone notification or pop-up push. 3、 Encouraging content-producers to produce rumor-refuting or scientific content. 4、 Disseminating rumor-refuting content in the COVID-19 special column.		Continued from previous table
Intervening in Advance	Establishing cooperation mechanism with vaccine-related experts to accelerate the speed of verification in September 2020.	1、 Collecting vaccine-related information in advance and push it to users through the information stream. 2、 Paying more attention to authenticity of vaccine-related information in manual investigation. 3、 Improving users' ability of discrminate rumors or false information through accuratte push.	Depending on the cooperative relationship with specialists and institutions in the related field of COVID-19 in advance.	1、Cooperating with China Association for Science and Technology to carry out scientific communication about the vaccine-related issues in advance in September 2020. 2、Blocking accounts which disseminate rumors or false information and informing them of the reason why the accounts are blocked when deblocking.

In the process of Chinese Internet platforms participating in Infodemic management, the algorithm can effectively identify and manage the reappearance of existing rumors, so in the long-term prevention and control of epidemic, the ability of the governance body to adapt and adjust can be improved.

Regarding rumors or false information about foreign epidemics, neither the Reporting Center nor the Internet platforms have established a more effective cooperation mechanism with foreign organizations or professional institutions. There is no consensus on the basic model of Infodemic management in various countries. Therefore, in the management of Infodemics, there are structural deficiencies in information interconnection and cooperation mechanisms on a global scale.

In the "Push" link of Infodemic management, Tencent and Toutiao are representative platforms that apply algorithms for accurate push, while Sina Weibo does not use accurate push. This research believes that accurate push is more in line with the meaning of the topic of managing Infodemics. The Infodemic includes not only the negative impact of the spread of rumors or false information on Internet users, but also the negative impact of excessive information on users' cognition and mental state. The content of refuting rumors is essentially a kind of information. If rumor-refuting content are pushed to users who don't see the rumor or false information, then this kind of information is not only ineffective in dissemination, but will also cause confusion among users. As a result, they have also become affected by the Infodemic. The precise push is more in line with the goal of controlling the Infodemic, that is, to achieve a "Pareto Optimality" in a sense. The governance of the Infodemic is an important part of the governance of the Internet society and one of the important components of national governance, and "Pareto improvement" is also one of the important goals of national governance and policy design.

In the "Intervene" link of Infodemic management, the content of the interview broadened the existing settings of this research. Early intervention not only includes the popularization of epidemic-related knowledge, but also includes the advance construction of a rumor verification contact network and user education.

To a certain extent, the user education practices of Toutiao and Sina Weibo are more fundamental early intervention practices for groups affected by the Infodemic. Based on the above content, this study summarizes the basic mode of Chinese Internet platforms participating in Infodemic governance in the "Intervene" link as follows. On the basis of predicting the development stage of the COVID-19 epidemic, entities establish contact with experts in relevant fields in advance to verify rumors and try to fundamentally improve the self-judgment and immunity of Internet users against rumors or false information in various fields through user education.

This study uses semi-structured interviews to summarize the Infodemic prevention and control system in China and also test the effectiveness of the BPI model. More importantly, semi-structured interviews have also enriched the structure of the BPI model. The main body of Infodemic management should also include professional institutions and experts in the medical and health field. These main bodies are important participants in the verification of rumors and false information, as well as the main producer of content. So it is necessary to incorporate tehm into the framework of the

BPI model. (The revised BPI model will be shown in Chapter 5 of this article)

Although with the help of semi-structured interviews, this study has gained a more comprehensive understanding of China's experience in responding to the Infodemic, but in terms of the specific choice of measures of each subject, this study cannot obtain knowledge of effectiveness through interviews. Internet users are the group mostly affected by the Infodemic. Therefore, considering the perception of Internet users when using different Internet platforms is very necessary to understand the basic mode and reference experience of China's response to the Infodemic. This research will show the detailed results of the questionnaire in the next section.

Chapter 4 Audience perception of Infodemic prevention and control

Upon obtaining a relatively comprehensive understanding of the actions of various platforms in China's Infodemic prevention and control system, this study further adopts the method of questionnaire-based survey to evaluate the choices of various platform actions from the perspective of audience perception. The questionnaire is mainly based on the BPI model. It measures the audience's perception from three perspectives: user behavior, Infodemic perception on the platform, and self-emotional evaluation.

4.1 Survey sampling

According to the BPI model, China's Infodemic prevention and control system also include Internet users. Users' perception of platform behavior is also an important factor in evaluating the effectiveness of the Infodemic prevention and control system. Therefore, this study investigates the behaviors and perceptions of Internet users using Internet platforms during the COVID-19 pandemic by means of questionnaire surveys. The scale questions designed by this research can be divided into three categories, user behavior, perception of the Infodemic on the platform, and self-emotional assessment. A total of 555 samples were retrieved, 7 invalid samples were eliminated by observing the box diagram of the questionnaire filling time, and 10 invalid samples were eliminated through the screening question of smartphone usage. As a result, 538 valid samples were yielded. In this study, Stata MP16.0 statistical analysis software was used. Through calculation, the Cronbach alpha coefficient of the questionnaire is 0.8075, which is suitable for further statistical analysis through the reliability test.

4.2 Questionnaire analysis

4.2.1 Descriptive statistics on user characteristics and media usage

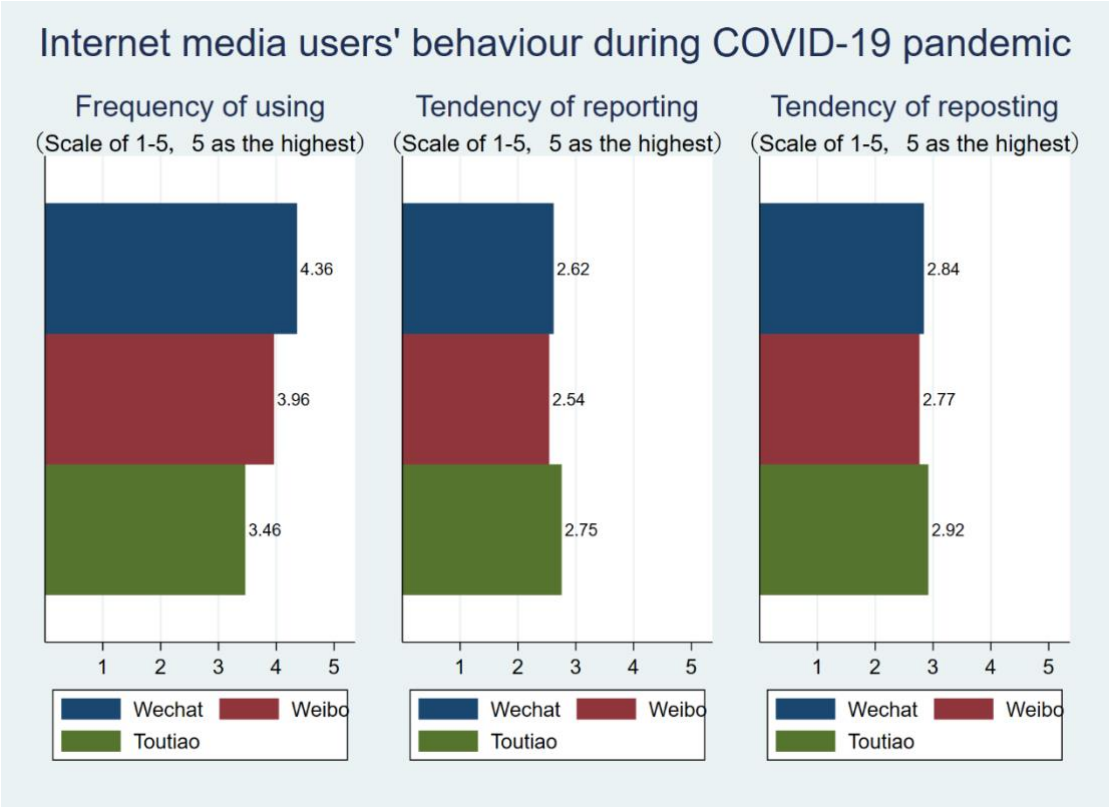

Figure 4.1 A bar graph comparing user behaviors of Internet media platforms during the COVID-19 pandemic

In terms of user media usage behavior, WeChat users use the most frequently(mean=4.360, sd=0.961), followed by Weibo (mean=3.958, sd==1.23) and Toutiao (mean=3.462, sd=1.224).

In terms of the tendency to report rumors or false information, Toutiao users are more inclined to report the rumors or false information they see (mean=2.754, sd=1.260), while the tendency of WeChat (mean=2.615, sd=1.336) and Weibo (mean=2.538, sd=1.280) users is not much different. Similarly, users of Toutiao are also more inclined to repost information about the epidemic situation they see on Toutiao (mean=2.918, sd=1.185). This tendency shows from one side that users of Toutiao may have a higher degree of trust in the epidemic-related information on the Toutiao platform, and the information on Toutiao will be easier to spread on other social media platforms. Integrating the tendency to report and the tendency to repost, this study infers that users of Toutiao have a higher level of involvement and participation in the content on the platform.

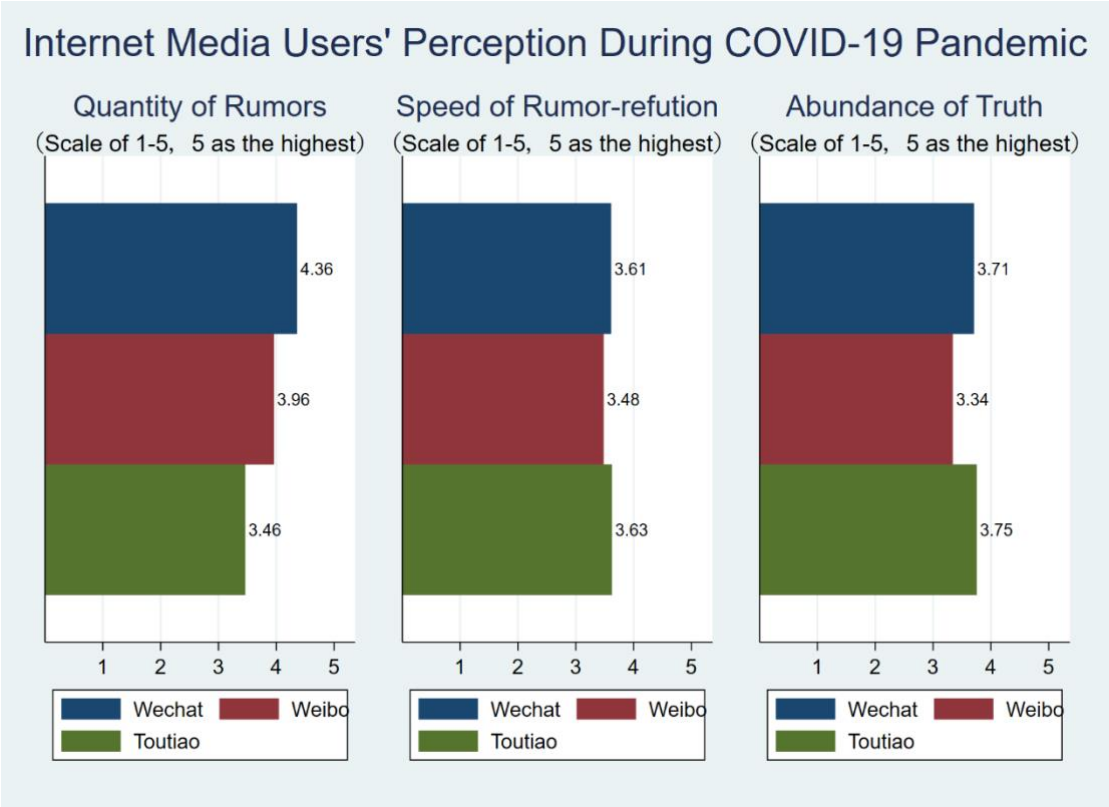

Figure 4.2 Bar graph of user perception comparison of Internet media platforms during the COVID-19 pandemic

In terms of user perceptions, users believe that the number of rumors on WeChat is significantly higher than that on the other two platforms (mean=4.360, sd=0.961). In terms of the speed of dispelling rumors (mean=3.626, sd=0.976) and the abundance of real information (mean=3.754, sd=0.926), Toutiao also performed better in the field of user perceptions. Fewer rumors, faster rumors dispelling speed, and ampler real information have also lent credence to the above inferences that Toutiao's lower level of Infodemics and higher levels of Infodemic governance. This has made its users more prone to repost information on the platform and actively participate in the report of rumors or false information on the Toutiao platform, which also promotes the formation of a virtuous circle.

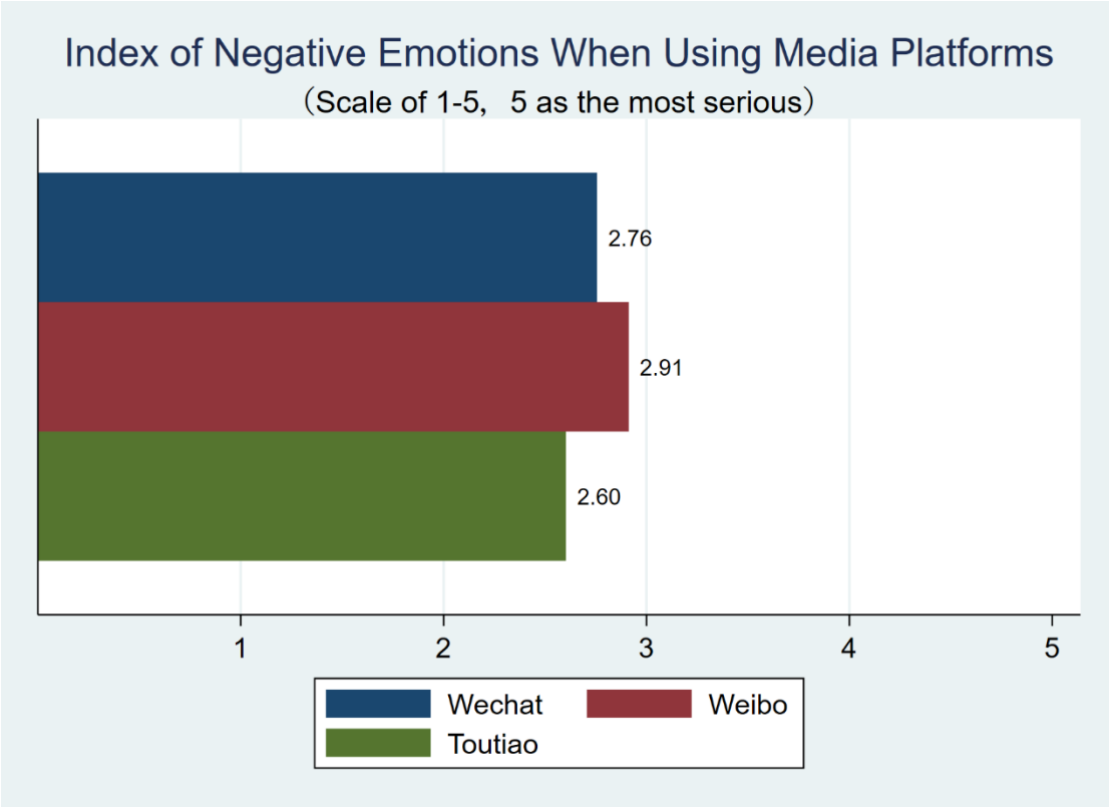

Figure 4.3 Bar graph of negative sentiment index when using media platforms during the COVID-19 pandemic

In terms of the impact of the Infodemic on users, this study uses "negative emotions (such as anxiety, loss of confidence, etc.) perceived when using a specific media platform" as the topic to evaluate. As can be seen from the figure above, the negative sentiment index of Toutiao and WeChat users is low, while that of Weibo users is relatively high (mean=2.912, sd=1.257). Based on this descriptive finding, this research will focus on analyzing why WeChat and Toutiao's negative sentiment index is lower while Weibo users' negative sentiment is more serious in inferential statistics and regression analysis. As a social phenomenon, the key result of the Infodemic lies in the impact on people's physical and mental health. Therefore, it is necessary to conduct an in-depth analysis of this factor.

4.2.2 Inferential Statistics

First of all, this study attempts to examine the statistical differences between the categorical variables through the chi-square test. Gender is an important basis for accurate push targeting, and the research of Cui and Wu (2019) also showed that gender affects users' perceptions of public affairs. Through the chi-square test, this study found that there is a difference in the use of Weibo between men and women (χ^2=7.5019, P<0.01). It shows that the proportion of female samples using Weibo is greater than the proportion not using Weibo.

Taking age as the column variable, the test results show that there are differences in the use of Weibo (χ^2=202.0839, P<0.01) and Toutiao (χ^2=122.0432, P<0.01) among samples of different ages. The usage rate of samples older than 30 is significantly lower than that of samples aged 30 years and younger. For Toutiao, the usage rate of samples

older than 40 is significantly higher than that of samples aged 40 and below. For users of Weibo and Toutiao, there is a clear dividing line in age. This dividing line is more likely to affect users' platform usage behavior and Infodemic perception. Therefore, in this study, 30 and 40 years old were used as the dividing line, and two new binary age variables "ageWeibo" and "ageToutiao" were generated.

Since the chi-square test results show that there is a certain relationship between Weibo usage and gender, this study also carried out an analysis of variance on the seven questionnaires of Weibo usage behavior and perception based on gender.

The analysis results show that the frequency of use of Weibo is significantly higher by women than men, and is about 0.5 higher on the 5-level scale ($F=7.56$, $P<0.01$). Compared with women, men are more inclined to report the rumors or false information they see ($F=4.60$, $P<0.05$).

Compared with male users, female users believed that Weibo's rumors dispelling speed was faster ($F=5.68$, $P<0.05$). This result and the previous analysis form a confirmation. Because female users perceive Weibo to dispel rumors faster than men's perception, they are less inclined to report the rumors or false information they see.

Using the same method and grouping basis, this study conducted an analysis of variance on seven scale questions related to WeChat. The results show that on the WeChat platform, men are more inclined to report rumors or false information they see than women ($F=5.45$, $P<0.05$).

Based on the above analysis, this research has reached a preliminary conclusion. On social media platforms such as Weibo and WeChat, male users are more inclined to report rumors or false information they see than female users. This conclusion also reflects a phenomenon worth thinking about. Why do men and women tend to report differently on social media platforms? This study speculates that the convenience of reporting and the difference in sensitivity of men and women to rumors or false information may be two potential influencing factors.

In the chi-square test part, this research generates two new binary age variables based on the test results. Therefore, this research also uses these two variables as the basis for grouping, and carries out the variance analysis of scale questions of their corresponding media platforms.

The analysis results show that among the seven questionnaires on Weibo, there is a significant age difference between the frequency of Weibo usage ($F=32.74$, $P<0.01$) and the number of rumors on the Weibo platform ($F=42.04$, $P<0.01$). Groups older than 30 years old showed lower frequency of Weibo usage and perception of rumors and false information. The grouping differences of these two items are greater than 1 scale value in the five-level scale, which is quite different. Therefore, in the regression analysis part, this study will consider the use of new age variables as interaction terms for the frequency of Weibo usage and the number of rumors perceived on the Weibo platform to establish a regression model.

Among the seven scale questions of Toutiao, there is a significant age difference in the number of rumors on Toutiao platform perceived by users ($F=9.49$, $P<0.01$). Similar to the above-mentioned method, this study will make interaction terms for the new age variable and the number of rumors perceived on the Toutiao platform when conducting

regression analysis on the related issues of Toutiao.

4.2.3 Regression analysis

First, this research conducted a linear regression analysis on WeChat. Taking into account the inference and statistics section, this study found that WeChat users of different genders have greater differences in the tendency to report rumors or false information. Therefore, this study will make an interactive item on gender and reporting tendency. In addition, because WeChat is China's largest social platform, users often use WeChat to repost information they see on other platforms. Especially during the COVID-19 epidemic, WeChat has become an important medium for sharing information about the epidemic among family members and friends. Therefore, this study chooses to include the number of rumors perceived by users of Weibo and Toutiao as proxy variables into the regression model, and use these two variables to replace an indicator that is difficult to measure, all reposts of rumors or false information on other platforms via WeChat.

Taking the negative emotions perceived by WeChat users as the dependent variable, the other six scale questions on WeChat, the number of rumors perceived by users on Weibo and Toutiao as the independent variables, and the interactive items on WeChat's reporting tendency and gender, this study established the following linear regression equation:

*Wechat7=k1*Wechat1+k2*Wechat2+k3*Wechat3*gender+k4*Wechat4+k5*Wechat5+k6*Wechat6+k7*Weibo2+k8*Toutiao2+k0*

The BP test result is realistic, F=3.23, P<0.01, the null hypothesis of homoscedasticity is rejected, and the model has the problem of heteroscedasticity. In order to correct this problem, this study abandoned the traditional OLS regression and instead used FGLS regression to analyze the situation of WeChat.

The following regression analysis results are obtained in this study:

Table 4.1 Regression result of Wechat

	(1)
	ystarwechat
Wechat1star	0.192
	(1.28)
Wechat2star	-0.0127
	(-0.17)
0.gender#c.Wechat3star	0.115
	(1.30)
1.gender#c.Wechat3star	0.182**
	(2.79)
Wechat4star	0.111
	(0.79)
Wechat4star	0
	(.)
Wechat5star	-0.0680
	(-0.63)

Contiuned from previous table

Wechat6star	0.0235
	(0.34)
Toutiao2star	0.369
	(1.83)
Weibo2star	0.243
	(1.59)
constantwechat	-0.205
	(-0.23)
N	51
R^2	0.988
adj. R^2	0.986

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It can be seen that in the interaction items of reporting tendency and gender, the reporting behavior of men significantly affects the perceived negative emotions (P<0.01). The specific results are as follows. For male users, in the five-level scale, for each increase in the tendency to report rumors or false information seen on WeChat, the level of negative emotions they perceive when using WeChat will rise by 0.182 levels, that is, men's reporting tendency is positively correlated with the level of negative emotions they felt.

This finding appears to be a more indirect relationship, but in light of the actual situation, this relationship is still easy to understand. The tendency to report rumors or false information reflects the user's awareness and trust in information. The higher the tendency to report, the stronger the awareness of discrimination and the lower the degree of trust. In the process of using WeChat, if there is a low level of trust in the information itself, or the content on the platform makes users suspicious, then it will naturally lead to an increase in the level of negative emotions. According to the research of Cui et al. (2019), men themselves pay more attention to social affairs than women, and WeChat is an important medium for social affairs. Therefore, during the COVID-19 epidemic, WeChat should consider reducing the push of epidemic-related information to male users, especially the content produced by non-authoritative organizations, so as to reduce their suspicion and negative emotions, thus confines their impact on the degree of Infodemic.

For Weibo and Toutiao, this study performs OLS regression analysis to explore the impact of various factors on the level of negative emotions perceived by users.

In the part of inference statistics, this study found that the number of perceived rumors and frequency of use of the Weibo platform are related to the age variable. Therefore, this study separates the age variable with the number of perceived rumors on the Weibo platform (Weibo2) and frequency of use (Weibo1). Doing the interaction term, the following regression equation is established:

*Weibo7=a1*Weibo1*ageWeibo+a2*Weibo2*ageWeibo+a3*Weibo3+a4*Weibo4 +a5*Weibo5+a6*Weibo6+a7*gender+a0*

Therefore, for the regression analysis of Weibo, this research has the following analysis results:

Table 4.2 Resgression result of Weibo

	(1)
	Weibo7
Weibo6	0.286***
	(4.34)
Weibo5	-0.213*
	(-2.30)
Weibo4	-0.00637
	(-0.07)
Weibo3	0.0889
	(1.47)
0.ageWeibo#c.Weibo2	0.418***
	(5.43)
1.ageWeibo#c.Weibo2	0.367**
	(3.09)
0.ageWeibo#c.Weibo1	0.0527
	(0.68)
1.ageWeibo#c.Weibo1	0.193
	(1.81)
0.gender	0
	(.)
1.gender	0.0564
	(0.40)
_cons	0.854*
	(2.47)
N	260
R^2	0.325
adj. R^2	0.301

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It can be seen from the results that in the five-level scale, every time the tendency to actively repost the epidemic-related information on Weibo increases by one level, the level of negative emotions perceived by users increased by 0.286 levels, which is statistically significant (P<0.01). And every time the user's perceived sufficiency of real information about the epidemic on Weibo increases by one level, the level of negative emotions they perceive will drop by 0.213 levels, and this negative correlation is also statistically significant (P<0.05). In terms of the interaction effect, those aged 30 or lower and those above 30 both showed statistically significant difference in the number of rumors perceived (both P<0.01). However, the coefficients of the two are different. The specific performance is that for users aged 30 or lower, the amount of

rumors or false information they perceive increases by one level, the negative emotion they perceive increased by 0.418 levels. For users aged 30 or above, the amount of rumors or false information they perceive increased by one level, the negative emotion level they perceive will increase by 0.367 levels. In terms of perceived rumors or false information, users aged 30 and below are more affected by the Infodemic.

From the regression analysis results, it can be seen that the active reposting tendency and the amount of rumors or false information perceived are positively correlated with the perceived negative emotions. Therefore, when managing the Infodemic, Weibo should pay attention to how to reduce the impact of users on the Infodemic when the reposting behavior occurs. For example, when reposting information related to COVID-19, the keyword recognition function of the algorithm can be used to remind users to think carefully when reposting, and provide relevant content for users to refer to, so as to avoid psychological frustration brought to users when they repost rumors or false information. Due to the obvious age stratification of Weibo users, when managing the Infodemic, Weibo should also consider more careful content screening for users aged 30 and below. The positive correlation between the number of rumors or false information and the perceived negative emotions also shows that controlling the number of rumors on the platform is critical to the management of the Infodemic on Weibo. At the same time, Weibo should also do more content production, and reduce the impact of Infodemic on users by increasing the abundance of real information on the platform.

Based on the correlation between some variables and age in Toutiao, this research completely refers to the analysis method of Weibo to perform regression analysis on related topics in Toutiao, and establishes the following regression equation:

*Toutiao7=b1*Toutiao1+b2*Toutiao2*ageToutiao+b3*Toutiao3+b4*Toutiao4+b5*Toutiao5+b6*Toutiao6+b7*gender+b0*

Table 4.3 Regression result of Toutiao

	(1) Toutiao7
Toutiao6	0.111
	(1.23)
Toutiao5	0.0612
	(0.62)
Toutiao4	-0.00851
	(-0.09)
Toutiao3	0.0108
	(0.16)
0.ageToutiao#c.Toutiao2	0.493***
	(6.34)
1.ageToutiao#c.Toutiao2	0.502***
	(5.50)
Toutiao1	0.0601
	(0.83)
0.gender	0

Continued from the previous table

	(.)
1.gender	0.0705
	(0.51)
_cons	0.593
	(1.34)
N	171
R^2	0.318
adj. R^2	0.284

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

According to the above regression analysis results, it can be seen that the number of rumors or false information perceived by Toutiao users of different ages is positively correlated with the negative emotions they perceived. For thosed aged 40 or lower, the level of rumors or false information they perceived increased by 1 level, while the negative emotion they perceived increased by 0.493 levels. Every time the degree of rumors or false information increases by 1 level, the negative emotions they perceived increased by 0.502 levels.

Therefore, in response to the Infodemic, Toutiao should also take targeted measures against users who use it more frequently — users over the age of 40 — such as pushing more contents from authoritative sources to provide more targeted science information. This deems conducive in achieving a more precise reduction of the impact of the Infodemic on its users.

4.3 Summary of the Survey Study

Through analyzing the survey, this study has a further answer to the research question. In the process of Infodemic management, algorithm-driven accurate push is a more effective means of dispelling rumors, which can better reduce the the impact of Infodemic on users. And on platforms where the gender and age of users are clearly layered, accurate push is even more realistic. It can be seen from the descriptive statistics that, compared to WeChat and Toutiao, which use algorithm-driven accurate push, Weibo users perceive lower real information abundance, and their perceived negative emotion levels are also higher. It can also be seen from the regression analysis that the number of rumors exposed by users in the age group with a higher frequency of Weibo use during the epidemic has a greater impact on the level of negative emotions. These all support the necessity of accurate push to dispel rumors and provide true information.

In addition, through analyzing the survey, this study also found that the function settings for reporting by users on different platforms will not only affect the reporting

tendency of users, but also affect the negative emotions perceived by users. User reporting is an important way to discover rumors or false information. Therefore, it is necessary for the Internet platform to set up a user-friendly reporting portal for the management of Infodemics.

Chapter 5 Conclusion

5.1 Research findings

After the above research and analysis, this research attempts to explain the research questions as follows.

China's response to Infodemic prevention and control system is led by the Cyberspace Administration of China and other government departments, in conjunction with Internet media platforms such as Tencent, Sina, and Toutiao, to use Internet user reports as important rumors or false information clues, and to introduce experts in related fields to build a multi-agent interactive prevention and control system for force verification. The China Internet Joint Rumor Refusal Platform established by the Cyberspace Administration of China integrates the resources of government departments, Internet media platforms, and local media to build a systematic and complete framework for the management of the Infodemic. Internet media platforms are the front-line force in the management of Infodemics. They use algorithms and manual methods to effectively and quickly identify rumors, and accurately push the content of rumors through algorithms to minimize the impact of rumors. Experts and scholars in the medical and health field are the main force for verification of rumors or false information. Smooth communication channels and cooperation mechanisms among government departments, Internet media platforms and experts and scholars in the medical and health field are important guarantees for the efficiency of China's response to the Infodemic.

This prevention and control system for China's response to the Infodemic has played a good role in the function of different entities. Each entity performs its own duties and can ensure high efficiency in responding to the Infodemic caused by the sudden COVID-19 pandemic. The advantage of government departments lies in their mobilization ability, so it is more effective to build a platform for multi-subject cooperation by government departments. The advantage of China's Internet media platform lies in the accumulation of a large amount of data and the advancement of algorithm technology. Therefore, the discovery of rumors and the promotion of rumor-defying content by the Internet media platform play its technical advantages. Experts and scholars in the medical and health field themselves do not have strong information dissemination capabilities, and it is more appropriate for them to be the producers of content to refute rumors. Under the framework of multi-agent participation in governance, the initiative of Internet users has also been brought into full play. The information reported by users fills in the loopholes in algorithms and manual identification. China's experience in responding to Infodemics is an important manifestation of Internet thinking.

Therefore, China’s experience in responding to the Infodemic lies in the

participation of the government, Internet platforms, expert institutions, and netizens, and joint efforts in the management of Infodemics. Each entity exerts its comparative advantages, especially the use of algorithm technology on the Internet platform to improve the efficiency of response to a large number of rumors or false information, and reduce the secondary disaster of Infodemic caused by information redundancy. Algorithms are a very effective tool when dealing with Infodemics. It can realize the rapid salvage of massive amounts of information and achieve precise access to those affected by the Infodemic.

The BPI model proposed in this study has also been basically proved in the process of semi-structured interviews and questionnaire surveys. The BPI model is an abstraction and generalization of China's Infodemic management, and it can be used as a theoretical tool to be extended to other countries. Based on the above research and analysis, this research also revised the BPI model, as shown in the figure below.

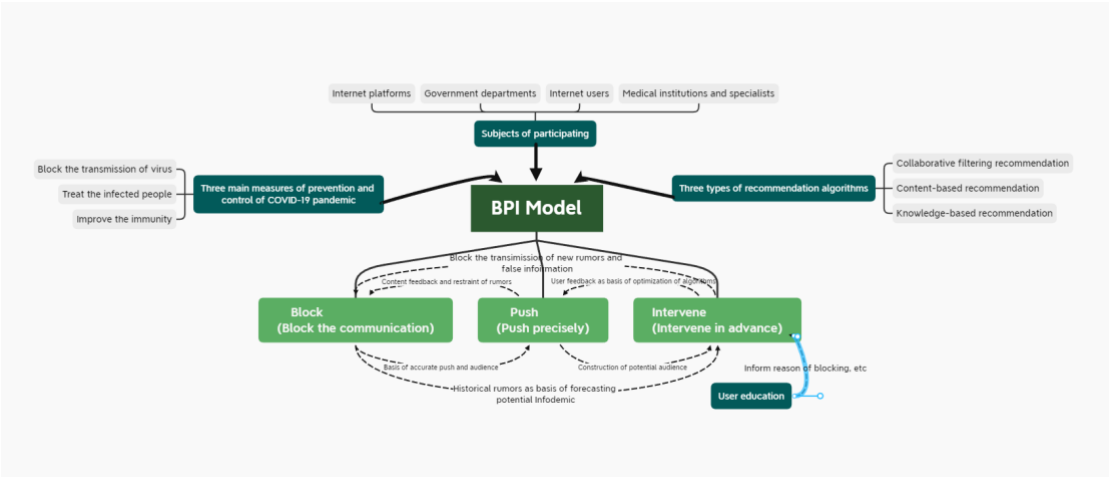

Figure 5.1 Schematic diagram of the revised BPI model

Compared with the BPI model proposed for the first time in Chapter 3, after in-depth interviews and questionnaire surveys, this research has supplemented the main body of "medical and health institutions and experts" as an important subject for verification of rumors in the main body participation part, and linked educatting users and intervening in advance together.

Although China has made remarkable achievements in responding to the Infodemic, the algorithm-driven multi-subject co-governance model also has strong promotion significance. However, in the process of China's Infodemic management, there are still two problems. First, the importance of algorithms has not been universally recognized by Internet media platform. Secondly, China has a low degree of international cooperation in the process of responding to the Infodemic. The processing efficiency of domestic rumors or false information on an international scale is still low. Therefore, as the dominant force in China's Infodemic management system, government departments should take the lead in playing the role of algorithms in responding to Infodemics, and jointly build and share data and algorithm tools with various Internet media platforms. There is also a need to establish a mature information exchange mechanism in the global field, especially during the COVID-19 pandemic. The exchange of information on the epidemic of various countries also plays an important

role in reducing the level of Infodemics on a global scale.

5.2 Limitations

Although in the academic field of Infodemics, this study is the first to systematically explore countermeasures, especially the study of the function of algorithms, but this study still has great limitations.

In the semi-structured interviews, subject to the interview conditions, this study failed to include all mainstream Internet media platforms in China into the scope of the interviews. Therefore, the summary of the ways in which Chinese Internet platforms participate in the management of Infodemics is only representative and not comprehensive. Some subjects with relatively small user levels but unique methods of participating in Infodemic management were not included in the interviewees, such as Dr. Dingxiang.

In the questionnaire survey, due to the sample size and the influence of cross-platform content dissemination, this study failed to use the instrumental variable method that is more commonly used in the research community. Since this study was not carried out during the period when the COVID-19 pandemic in China was more serious, the respondents' perception of the questionnaire may also deviate from the actual situation at the time, and could not be very accurately reflected in the COVID-19 pandemic and the Infodemic. In addition, due to the limitations of the online snowball survey, this study did not use a more accurate composite scale when measuring the user's perception of negative emotions.

Due to the limitations of the researcher's disciplinary background, this study only discusses the operating mechanism of the algorithm from its functional use and characterization, and does not discuss more application scenarios from the perspective of the algorithm's mechanism. During the interview process, this study also only asked the interviewees in detail about the algorithm tools learned in the literature review. The algorithm tools used by the interviewees may have potential omissions.

5.3 Prospects for future research

As a pioneering study, this research hopes to inspire more researchers to pay attention to the academic topic of Infodemic management, especially when the global epidemic is spreading, to think about how to reduce the negative impact of the epidemic on the public from a perspective other than epidemiology. In the future, researchers can consider a large-scale user survey, especially for the functional design of user reporting and information recommendation on the platform, to explore whether there is a set of algorithm-driven function design that can be promoted in the process of managing Infodemics. feature design.

In addition, this study only summarizes China's experience, and does not analyze the reasons why other countries with more serious Infodemics have failed in governance. It is hoped that other researchers will be able to explore the modes of Infodemic management in these countries from the perspective of other countries in the world, and compare them with China's experience, so as to provide better experience reference for the governance of the global Infodemic.

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