

Research on hot topics and trends of China's emergency management research based on bibliometrics

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Abstract. This study summarized 2446 literatures in the field of emergency management research of CNKI from 2003 to 2022. Literature measurement was carried out by CiteSpace and VOSviewer software. From the perspectives of annual publication, institution distribution, journal distribution, author distribution, research topic and research trend, etc., This paper studies the overall development sequence, research hotspots and development trend of the field, and systematically studies the key words, topic evolution state and dynamic evolution path in the field of international emergency management in the past two decades.

Keywords: emergency management, Knowledge graph, Hot topic.

1. Introduction

Uncertainty has become the main feature of today's society, and the emergency management of emergencies has become an important part of measuring national governance ability. In 2003, the SARS epidemic led to a global epidemic of infectious diseases. Since then, China has gradually established and improved the emergency management system of "one case, three systems" to deal with major public emergencies^[1]. In 2018, the establishment of the Ministry of Emergency Management opened up new topics for scholars in this field, including the reform of emergency management system, departmental reform and central and local management. Today, in the context of COVID-19, emergency management has received unprecedented attention in the real world. Therefore, it is necessary to sort out the research hotspots in the field of emergency management in the past 20 years and explore the frontiers in this field.

At present, the research in the field of emergency management is white-hot, and the research upsurge has reached a new height. Based on the policy framework of "one case, three systems", most scholars in the field of public administration set foot in the grassroots, analyze its realistic performance and institutional dilemma, and put forward the corresponding optimization path^[2]. Huang Lifu and Zhao Cheng believe that China's emergency management system from 2003 to now has been initially built to the emergency plan as the core, promote the construction of "one case three system" emergency management system^[3]. Zhong Kaibin believes that governments at all levels should constantly improve the system content of coping with risks based on the institutional foundation laid by the "one case three system"^[4]. Zhang Zheng and Li Zhenghua put forward that "emergency management" is the cornerstone of maintaining and realizing national public security, and plays a crucial role in realizing the modernization of national governance system and governance capacity^[5]. Han Zhiyong and Weng Wenguo embarked on the major research plan of "Unconventional Emergencies Emergency Management Research", put forward the ideas and arrangements of organizational management work, and provided scientific support for the follow-up work in the field of emergency management^[6]. It can be seen from the above review that scholars' research on the field of "emergency management" is mainly from the perspective of theory and concept, and there is little combination of projects and themes. However, the research projects funded by national funds must be the projects that have been extensively and deeply studied and have been certified by experts in related fields^[7]. Shen Hongzhou, Shen Fei and other scholars proposed that the combination of project

and theme should be strengthened [7]Therefore, this study retrieves and analyzes the data of emergency management funded by national Natural Science Foundation of China.

To sum up, emergency management is a multidisciplinary field, including "public health events, big data".Therefore, in order to better display the research prospect in the field of emergency management, this study uses CNKI as the database to collect data, and conducts an analysis on the topic evolution of the current domestic research status, research hotspots and research frontiers in the field of emergency management, and conducts an in-depth study based on multiple indicators such as journals, keywords and references^[8]. It provides theoretical basis and practical reference for promoting sustainable scientific development of emergency management in China^[9].

2. Data retrieval

The fight against SARS outbreak in 2003 was a landmark event when China began to attach importance to emergency management^[10]. Therefore, this study defined the period from 2003 to 2022 as the time interval, determined CNKI database as the data source of the paper, with "emergency management" as the main title, and set the journal source categories as SCI, EI, Peking University core and NTU Core.In addition, the national Natural Science Foundation of China and National Social Science Foundation of China were selected as project data sources in this study, and the retrieval time was February 23, 2022.As the data of medical and technical types did not match the purpose of the research, 1618 articles of academic literature and 1718 projects were determined after several rounds of discussion and screening by experts^[11].

3. Basic status of research in the field of emergency management

3.1. Annual publications and growth trend

Based on the retrieved references, this study drew a statistical chart of the number of publications and change trend in the field of emergency management funded by national Natural Science Foundation of China and National Social Science Foundation of China from 2003 to June 2022, as shown in Figure 1.According to the average annual number of publications^[12], the research in the field of emergency management in China can be divided into three stages:

(1) Embryonic stage: from 2003 to 2007, the annual output of literature journal papers was only 90. At this stage, the literature volume increased slowly, and scholars just paid attention to this topic, which was in the embryonic stage of research.

(2) Development stage: From 2008 to 2018, the number of papers published on this stage showed a trend of fluctuation and steady growth, and decreased slightly from 2015 to 2017, which was in the stage of stable development of research.

(3) Blowout stage: After the establishment of the Ministry of Emergency Management in 2018, research in the field of emergency management in China increased rapidly. In 2020, due to the impact of COVID-19, the number of published papers peaked and then declined.The overall number of papers published on this topic is in a spurt, indicating that scholars attach great importance to this topic under the influence of national policies and are in the stage of rapid development of research.

3.2. Distribution of research institutions

The number of research institutions in this field is increasing year by year, and 10 representative institutions such as Sichuan University have become the backbone of the research on this topic, and the number of publications is not less than 10, as high as 8 institutions.The data show that the distribution of institutions in the network diagram is relatively scattered, and the number of clustering among institutions is small, indicating that the cooperation between various research institutions is not close enough.Statistics can be seen in the relatively close cooperation institutions, such as system engineering research institute of southeast university and xiangtan university school of public management, management of dalian university of technology and science college of engineering and

school of public management, xi 'an jiaotong university, nanjing university and nanjing university school of government social risk with the public crisis management research center, etc. In addition, there are also many institutions in an independent state, with almost no cooperative relationship with their institutions, such as School of Management of Lanzhou University, School of Management of China University of Mining and Technology, And China Research Institute of Work Safety. The previous strengthening of cooperation between research institutions has played a great role in promoting the in-depth research and progress of our national emergency management cause, and the cooperation between various institutions still needs to be strengthened.

3.3. Statistical analysis of co-occurrence of authors

According to Price's law, the core author group is analyzed to explore whether a core author group is formed in this topic field. The number of core authors is determined by the maximum number of publications. If the number of core authors reaches 50% of the total number of authors, a core author group is formed; otherwise, there is no core author group. The value of the minimum number of core authors' publications M is 0.749, which refers to the maximum number of publications. $\sqrt{N_{MAX} N_{MAX}}$ According to preliminary statistics $=31$, $M \approx 4.17 \cdot N_{MAX}$. Statistical data show that 59 authors published more than 4 articles, and they wrote a total of 526 articles, accounting for 32.50% of the total 1618 articles, lower than the 50% required by Price's law. Therefore, until now, the core author group of the research in the field of emergency management has not been fully formed, so it can be seen that the cooperation between scholars needs to be further strengthened, and the cooperative relationship between researchers needs to be further strengthened.

4. Analysis of hot research topics and trends in the field of emergency management

4.1. Keyword mutation trend

The research in the field of emergency management in China can be roughly divided into three stages, and each stage has its own research hotspot.

The first stage (from 2003 to 2012) marked the beginning of the mechanism research in the field of emergency management in China [9], with key words including crisis management, supply chain, public crisis, coordination and Wenchuan earthquake. Research in this period focused on disaster relief and disaster reduction as well as pairing assistance. In the past ten years, from the SARS outbreak in 2003 to the Wenchuan earthquake in 2008, China not only faced the epidemic emergency management, but also faced the emergency management of natural disasters. In 2012, the third Plenary Session of the 18th Central Committee of the Communist Party of China announced the "Decision of the Central Committee of the Communist Party of China on the major issues of comprehensively deepening reform" document, on behalf of China's emergency management ushered in a new era. During this period, scholars have gained practical experience in the handling and response of emergencies, which promotes the deepening of scholars' research in the field of emergency management.

The second stage (from 2013 to 2017) shows that the research in the field of emergency management in China has entered a period of rapid growth. Key words in this stage mainly include: emergency capability, knowledge element, emergency, government, emergency rescue, emergency decision-making, public management, smart city, big data, information system and emergency information. Most of the researches of scholars in this period focused on the public management concept and value target with "government" as the main body^[10] And through big data innovation of public management mode to promote the construction of smart city^[11].

The third stage (2018 to 2022) represents the fund projects in the field of emergency management in China to enter the peak period. Keywords emerging at this stage mainly include risk management, COVID-19, epidemic prevention and control, public health and emergency management. Since the

establishment of the Ministry of National Emergency Management in 2018, the construction of national emergency management has been promoted on the whole. In response to the call of the government, scholars have gradually focused on improving the informatization capacity of national emergency management, improving the overall national security construction and public participation^[12], the outbreak of COVID-19 in 2020 has made epidemic prevention and control and response measures a hot spot and frontier in research.

4.2. Keyword co-occurrence analysis

Keywords co-occurrence analysis is helpful to study the relationship between high-frequency hot words. The more times similar keywords appear in different literatures, the closer the relationship between keywords is, and it can also reflect the research topics and hotspots in this field. Through keyword analysis, emergency management was found to be the most closely related with 615 occurrences, followed by emergencies (199), emergency plans (50), big data (34), crisis management (33), emergency decision-making (30) and public crisis (28). To sum up, emergency management and emergencies are frequently concerned by researchers, and emergency plans and big data, crisis management and emergency decision-making, public crisis and COVID-19 have all become research hotspots in the field of emergency management.

4.3. Theme clustering and trend analysis

Citespace was used for keyword clustering analysis. Based on the co-occurrence analysis of keyword clustering, the cluster label atlas was generated and analyzed. Through the analysis, different topic clustering groups were found to further clarify the core topic of the study. It is generally considered that the clustering structure is significant if the clustering module value (Q value) is greater than 0.3, and the clustering is convincing if the S value (average contour value) is greater than 0.7. Q value of this topic is 0.853, indicating that the clustering structure is robust, S value is 0.913, indicating that the clustering is convincing and the results are credible. Keyword clustering display: the total number of clusters is 22, of which 12 clusters generate labels. The key word clustering node information is counted and the core academic picture of the fund in the field of emergency management is outlined. The smaller the cluster number is, the greater the number of keywords contained in the cluster, which indicates that the study has attracted more attention from scholars. Due to the overlapping phenomenon of key word nodes in each cluster, which affects the presentation of core overview, the information of nodes is summarized and integrated, and it is found that the fund projects related to emergency management mainly focus on emergency management of emergencies, measures to solve public crises, and the construction of social system of emergency management.

Table 1 specifically covers clustering labels formed by keywords: for example, emergency management, emergencies, emergency plans, emergency decision-making and social network analysis all belong to the category of emergency management; Public crisis, decision support, emergency organization assignment, emergency resources layout and system construction all belong to the category of public crisis. Crisis management, the United States, mechanisms, and emergency preparedness all fall into the category of emergencies.

Table 1. Clustering labels of keywords in China's emergency management field

The serial number	Clustering tags	The main content
# 0	Emergency management	Emergency management, emergencies, emergency plans, emergency decision-making, social network analysis
# 1	Public crisis	Public crisis, decision support, emergency organization assignment, emergency resources layout, system construction

# 2	The emergency	Crisis management, United States, institutions, emergency preparedness
# 3	Natural disasters	Emergency, emergency management, ontology, emergency management, emergency awareness
# 4	The emergency response plan	Rural public crisis, authority constitution, institutional risk, recovery and reconstruction, public policy

5. Conclusions and expectation

5.1. Conclusion

In this study, CNKI literatures in the field of emergency management in the past 20 years were taken as the research object, and the research overview, evolution and hot spots in this field were analyzed by using the method of applied literature measurement, in order to lay a foundation for subsequent research. To sum up, this study has the following three conclusions:

At the level of general overview: In terms of the number of publications, statistics on the number of publications in the past 20 years show that the domestic academic circle attaches more importance to the field of emergency management year by year; In terms of institutions that publish literature, universities are the main ones, and most of them are distributed in the eastern and central regions, with uneven geographical distribution and lack of effective cooperation among institutions. In terms of co-occurrence of published authors, a cooperative circle with Zhang Haibo, Zhong Kaibin and others as the core has initially appeared, but the number of articles published is below the basic requirement of 50% of Price's Law, and the core author group has not yet been formed, and the cooperative relationship among researchers needs to be further strengthened.

Research hotspots: Through clustering and co-occurrence analysis of keywords, the top ten keywords with the highest frequency are emergency management, emergencies, emergency plans, big data, crisis management, emergency decision-making, public security, COVID-19, and emergency response. Through the analysis of research hotspots, it is found that the research hotspots can be summarized as basic research on emergency management, research on emergency management strategies for the government to deal with emergencies, and integration of emergency management and big data. Combined with the background of current events, it can be seen that the research on emergency management in China can focus on hot major events, and the practicality and application of the research are relatively prominent. The research covers a relatively rich content, covering the whole process of emergency management.

At the level of research context: According to the list of emergent words, the research of national funds in the field of emergency management is mainly divided into three stages: initial stage, development stage and climax stage. The initial stage is the construction stage in the field of emergency management from 2003 to 2012, during which the research focus is on disaster relief and disaster reduction and counterpart assistance. Development refers to the development stage of emergency management from 2013 to 2017. The proposal of the national overall security concept in 2014 marked the beginning of the deployment of emergency management work from the national strategic perspective. At this stage, "new media, big data" and other studies began to integrate with the field of emergency management. The climax stage is the climax of 2018-2022 emergency management research. After the establishment of the Ministry of National Emergency Management in 2018, the related work and research also took a step forward. It is expected that in the future, the study of emergency management will continue to deepen and comprehensive, and the number of papers will keep rising.

5.2. Expectation

(1) Integrate resources and strengthen research

From the conclusion of the study, it can be seen that the research on this topic is relatively independent in terms of researchers; In terms of geographical distribution, the core research focuses on eastern and western China; In terms of research institutions, they are concentrated in universities and the links between universities are not close. Emergency management is a multidisciplinary field, involving many disciplines such as management, sociology and political science. Good emergency management measures can ensure the overall security of the country and the prosperity and stability of the society. Due to the multi-disciplinary nature of this field, it means that the value of emergency management can not be fully developed from a single theoretical perspective. Therefore, in the future, we should enhance the cooperation and communication between scholars, universities and institutions, strengthen the communication and integration between disciplines, improve the utilization value of academic resources, integrate various perspectives and theories to promote the study of emergency management to a more holistic and systematic direction.

(2) Focus on the frontier and carry out research

Policy guidance and support from the national level has promoted the comprehensive development of emergency management research and made significant breakthroughs. But looking at the world, emergencies emerge one after another, posing challenges to the safety of life and property of human society. Future scholars should put forward corresponding decision-making theories and methods based on current events, and group behavior guidance such as emergency organization coordination and emergency information management needs more in-depth research and discussion. In terms of research methods, we can also combine big data and cloud computing with The Times.

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