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Original Paper

Knowledge Mapping of Tourism Emergency Research: A Scientometric Review

Qin Liu[1*] & Yifei Yin[2]

[1,2] Research Institute of International Economics and Management, Xihua University, Chengdu, 610039, China

Abstract

All kinds of crises have brought great challenges to the survival and development of tourism. In view of the variety of crisis and the limitation of ex ante control effect, tourism emergency have substantially affected the decision-making behaviors of tourists. The academia worldwide has investigated tourism emergency from divergent perspectives to aid the tourism industry in improving its efficiency in tourism crisis management. This study utilizes the increasingly popular approach in scientometrics to analyze emergency research in tourism, thereby systematically and comprehensively presenting these studies as a whole. A total of 824 articles between 2001 and 2022 were collected. Subsequently, comprehensive knowledge maps of tourism emergency research, were identified using co-occurrence network and burst detection with research among institutions, authors, country, hotspots, based on institution-author networks, and identified tourism emergency discipline as well as contemporary research topics and most influential researchers.

Keywords

Knowledge mapping, Tourism emergency, CiteSpace, Visual analysis

Introduction

Compared with the conventional industries of national economy and people's livelihood, tourism is a relatively fragile and vulnerable industry. No matter it is sudden natural disaster crisis, medium and short term social and political conflicts, or long-term economic downturn turbulence, tourism may have a very strong impact (Ghaderi, 2012). The World Tourism Organization defines tourism crisis as an unexpected event that affects tourists' confidence in a destination and disrupts the continuation of normal business operations (World Tourism Organization, 2003).

Compared with the government's regular decision-making environment, crisis events are often in an abnormal social environment, which is a high aggregation of various uncertainties and adverse situations ((Yi, Liu, 2022). This is especially true of tourism crisis, which not only has various types and complex causes, but also has the characteristics of easy triggering, scattered distribution and

difficult management (Rosenthal, 1997). Compared with other crises, the subject of tourism emergency management is more diverse, including not only the government and industry departments, but also a large number of tourism practitioners and the public tourists, which further increases the difficulty of crisis management (Hosie, 2004).

From the Wenchuan earthquake in 2008, to the Lushan earthquake in 2013, to the Jiuzhaigou earthquake in 2017, each natural disaster has severely impacted the tourism industry of the affected destinations. As one of the regions with high incidence of natural disasters in the world, China suffers from frequent natural disasters, and its tourism industry suffers huge losses. According to Emergency Events Database EM-DAT, from 2000 to 2019, there were 583 natural disasters such as earthquakes, floods, landslides and extreme weather in China, with an average annual rate of nearly 30. The world is facing a similar situation, with 9,883 natural disasters in the past 20 years, or 495 per year (Wei, Li, 2022).

Natural disasters are increasingly affecting the management of tourist destinations. Snow-capped mountains, volcanoes, and plateau areas are usually scenic places, but they are also relatively high-risk places. Tourists are often not equipped to deal with emergencies. Therefore, during the disaster prevention and disaster period, the relevant personnel of the scenic spot should make great efforts in formulating and responding to emergency procedures. As a developed country in Asia, Japan is an increasingly popular tourist destination. As one of its famous attractions, Mt. Fuji is especially loved by people. However, the volcanic group of Mt. Fuji is basically erupting once a year, which means that there is a certain potential danger for tourists, and appropriate preparation measures must be taken. Also an emergency, in response to COVID-19, In order to formulate a long-term mechanism for cruise tourism, Liu et al. (2020) considered three aspects: the risk emergency management mechanism for cruise routes, the health and epidemic prevention supervision mechanism, and the international cooperation mechanism for infectious disease prevention and control. In their study, Ma et al. (2017) mentioned that in the tourism industry, one challenge is how to deal with emergencies while traveling. While most travel agencies focus on generating travel plans, an important part that is overlooked is providing creative emergency travel plans when users encounter unforeseen circumstances while traveling. Ritchie et al. (2008) mentioned that although there has been a growing body of research on tourism disaster management in the tourism field, most have emphasized and studied post-disaster reactive response and recovery efforts by the tourism industry at the expense of mitigation and preparedness strategies and initiatives. This paper synthesizes the hazard and emergency planning literature with tourism disaster planning research to examine possible gaps and future directions for research in this field. The thesis argues that tourism can only be understood through an understanding of the disaster, natural disaster and emergency planning field as well as an analysis of previous tourism disaster planning research. This synthesis suggests a "post-disciplinary" approach to the study and better understanding of tourism disaster planning involving researchers from disciplines such as education, communication, sociology, emergency planning, hazards and tourism. It is hoped that such

an approach will lead to more A good understanding of tourism disaster planning, mitigation and preparedness, and the development of appropriate policies and initiatives by tourism agencies and industry associations to facilitate more effective planning. The world's tourism emergency management is in development, and there is still much room for discussion on the content and methods in this field.

The current review utilizes the mapping technique CiteSpace to analyze and visualize tourism emergency, thereby presenting a panoramic view of the global tourism emergency research and enlightening future studies in this field. In particular, this study solves the following three problems:

1. Where are the researchers and research institutions concentrated in tourism emergency management research, and whether there are very representative figures?
2. What are the key words and hotspots in tourism emergency management research?
3. What will the development of tourism emergency management research look like?

Based on theoretical and practical needs, 824 literatures on tourism emergency were analyzed using CiteSpace system. The literature is mainly based on the English literature collected in the core collection of Web of Science. It summarizes the evolution process of global tourism emergency research since 2001, and finally puts forward suggestions based on the current tourism emergency management practice and facing problems, which can provide reference for future research and practice.

Literature summary

Bibliometric analysis is a quantitative analysis method, and CiteSpace is one of the most widely used bibliographic analysis tools in recent years. The literature used for literature analysis in this article is the author's entry in Wob of Science on June 9, 2022 with the subject words "Tourism emergency system" OR "travel emergency plan" OR "Tourism public events" OR "Hotel emergency" OR "Scenic emergency". The results were retrieved from the core collection of Science, and the results were refined by papers and the time period from 2001 to 2020. Finally, 824 papers were obtained. This is the analysis sample for this study.

In order to ensure the coverage of the literature data, this paper uses the Price curve function for verification. The formula is as follows, and the specific proof formula can be found in "Analysis of Hot Spots and Frontiers of Domestic Regional Innovation Research Based on Scientometrics". The final result is as shown in Figure 1.

$$F(t) = 2 * e^{0.3183t}$$

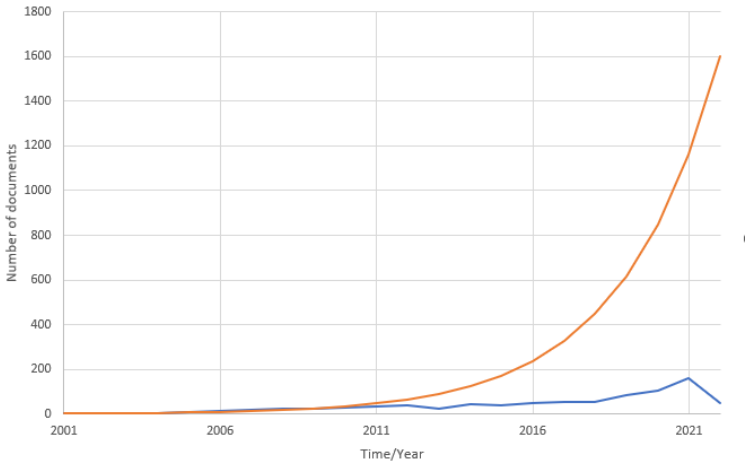

Figure 1. 2001-2022 Literature Quantity Curve and Price Curve

It can be seen from Figure 1 that the research in this field is completely fitted with the Price curve at the beginning of the research and the early development process. It shows that the application of the formula and the selection of the line of this paper are reasonable to a certain extent, which can ensure the coverage of the literature to a certain extent. The subsequent occurrence of curve fitting deviations means that there may be a certain gap between the number of published papers in this field and the actual forecast after 2011, and the research in this field has not reached a certain saturation state, and there is a large room for development.

Analysis of papers published by researchers and research institutions

Reference

Figure 2. Mapping of Reference

Figure 2 is a map of all cited references. The top ranked item by citation counts is Murray-tuite P (2013), with citation counts of 7. The second one is Chinazzi M (2020), with citation counts of 6. The third is Zhu N (2020), with citation counts of 5. The 4th is Getz D (2016) in, with citation counts of 5. The 5th is Belanger V (2019), with citation counts of 5.

Core scholars

The author co-occurrence analysis was carried out on the paper data using CiteSpace software, the time period was 2001-2022 and the time division was set to 1. Select the node type and set it to "Author", as shown in Figure 3. Finally, the author co-occurrence cluster diagram shown in Figure 4 appears.

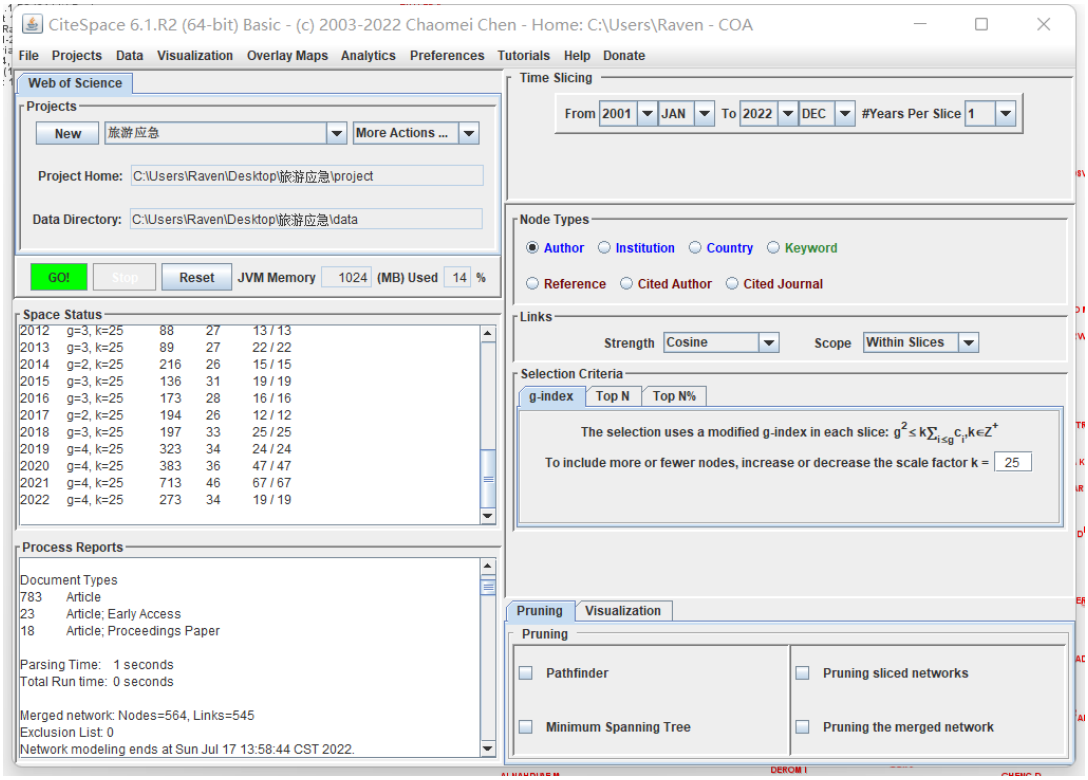

Figure 3. Author Clustering Map Setting Diagram

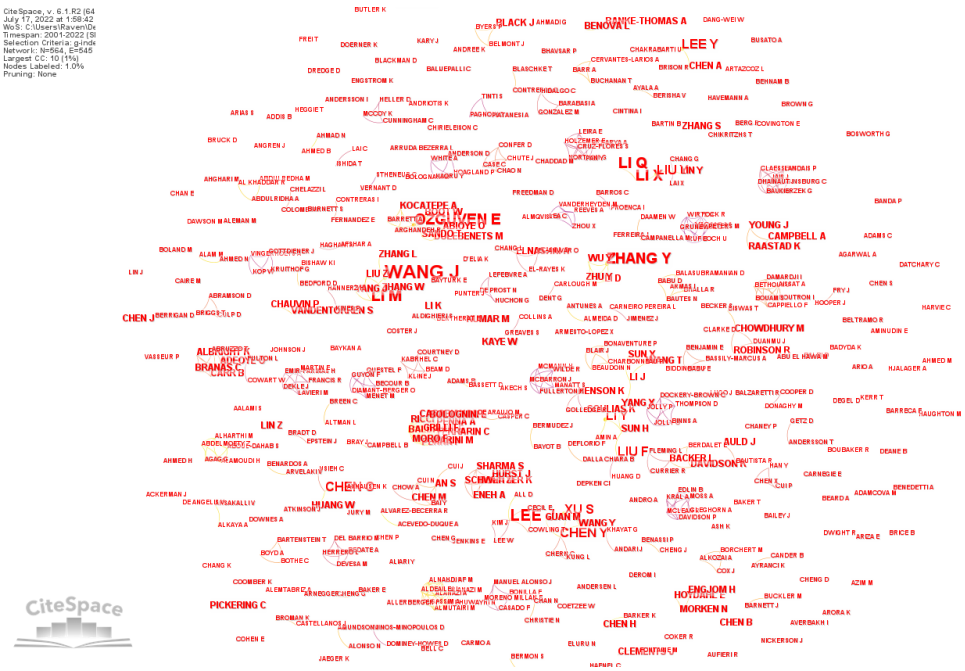

Figure 4. Author Clustering Diagram

Clustering analysis of the authors of articles related to tourism emergency can get the most influential authors in this field. In Figure 4, each node represents an author, the size of the node represents the volume of its publications, and the lines between the nodes represent the cooperation between authors. We can see from Figure 4 that there are relatively large number of authors in the author database related to tourism emergency included in the Web of Science, but most of the publications and relevance are actually very low, and very few have formed a teamwork in the field. This shows that there is still a lot of room for the development of authors in the field of tourism emergency, and the cooperation between authors needs to be closer, so as to continuously develop and expand research in this field. Table 1 shows a statistic of authors with a large number of papers in the selected papers.

Table 1. Number of Articles by Authors

Citation Counts	References
7	WANG J
5	LEE J
4	LI M
4	LI Q
4	LI X
4	ZHANG Y
4	OZGUVEN E
3	LIU F

3	LIU Y
3	CHEN C

Author's country

The CiteSpace software was used to analyze the co-occurrence of relevant author countries on the paper data. The time period was also from 2001 to 2022 and the time division was set to 1. Select the node type and set it to "Country" to get Figure 5.

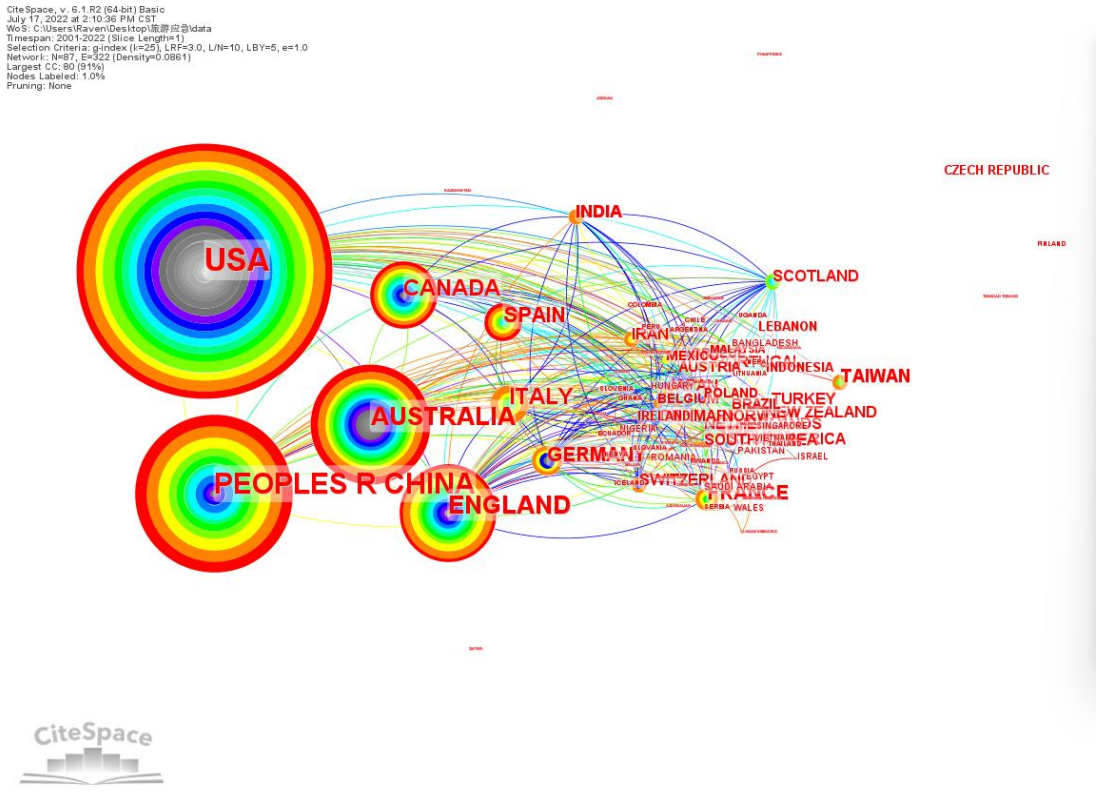

Figure 5. Author Country Cluster Map

Each node in Figure 5 represents a country, and the size of the circle indicates the number of articles selected in this article belonging to that country. The larger the circle, the greater the number. The lines between nodes also represent the strength of the cooperative relationship between countries. In the end, it can be seen that USA, PEOPLES R CHINA, AUSTRALIA, ENGLAND and other countries are at the forefront of the development of this field. Finally, Table 1 and Table 2 are obtained according to the built-in data processor of CiteSpace. Table 2 shows the specific quantity map of the countries to which the relevant articles belong. Table 2 shows the centrality of cooperation between countries.

Table 2. Number of Articles in Different Countries

Citation Counts	References
247	USA
152	PEOPLES R CHINA
74	AUSTRALIA
71	ENGLAND
47	CANADA
39	ITALY
34	SPAIN
30	GERMANY
20	TAIWAN

Table 3. National Centrality

Centrality	References
0.56	ENGLAND
0.49	USA
0.23	GERMANY
0.14	AUSTRALIA
0.10	ITALY
0.09	PEOPLES R CHINA
0.07	CANADA
0.06	FRANCE
0.06	MEXICO
0.05	DENMARK

From Table 2 and Table 3, we can conclude that USA has a relatively leading position in the field of tourism emergency, because its quantity and centrality are in the top two. For ENGLAND, although there are certain disadvantages in the number of articles, its centrality is higher than that of many other countries. This also shows that the research content and methods of this country may have a certain representativeness in this field.

Research institute

Figure 6. Research Institute Map

In terms of research institutions, Chinese Acad Sci ranked first with 10 articles, followed by Hong Kong Polytech University (8) and Univ British Columbia (7). The specific top ten rankings and numbers are shown in the Table 4. However, the centrality ranking differed from the research institution ranking. The top three universities in terms of centrality are Chinese Acad Sci(0.01), Louisiana State University (0.01) and UCL(0.00), showing the importance of the three institutions in hospitality research.

Table 4. Number of Articles from Research Institutions

Citation Counts	References
10	Chinese Acad Sci
8	Hong Kong Polytech
7	British Columbia
6	Louisiana State
6	Griffith
5	Beijing Jiaotong
5	Deakin
5	Utah
5	Rutgers State
5	UCL

Top 8 Institutions with the Strongest Citation Bursts

Institutions	Year	Strength	Begin	End	2001 - 2022
Hop Hotel Dieu	2001	2.57	**2002**	2005	
Queens Univ	2001	1.59	**2008**	2011	
Deakin Univ	2001	2.3	**2011**	2012	
Old Dominion Univ	2001	1.79	**2011**	2012	
Rutgers State Univ	2001	1.81	**2012**	2015	
Hong Kong Polytech Univ	2001	1.62	**2013**	2015	
Univ Utah	2001	1.7	**2015**	2018	
Chinese Acad Sci	2001	3.52	**2020**	2022	

Figure 7. Institutions with the Strongest Citation Bursts

Figure 7 is a ranking chart of institutions on citation burst strength, including his burst strength and the time period of the burst. We can see from the above figure 7 that the Chinese Acad Sci with the most citations has the highest outbreak intensity (3.52). We can see from the time period that he is an institution that has only participated in the topic in recent years, but finally presented the most research results.

Research hotspots

Figure 8 shows the keyword co-occurrence network for Tourism emergency studies that have been published over the past 21 years. All hotspots are clearly displayed in the figure, in which Model and Impact are the largest. Figure 8 also presents the connection between hotspots.

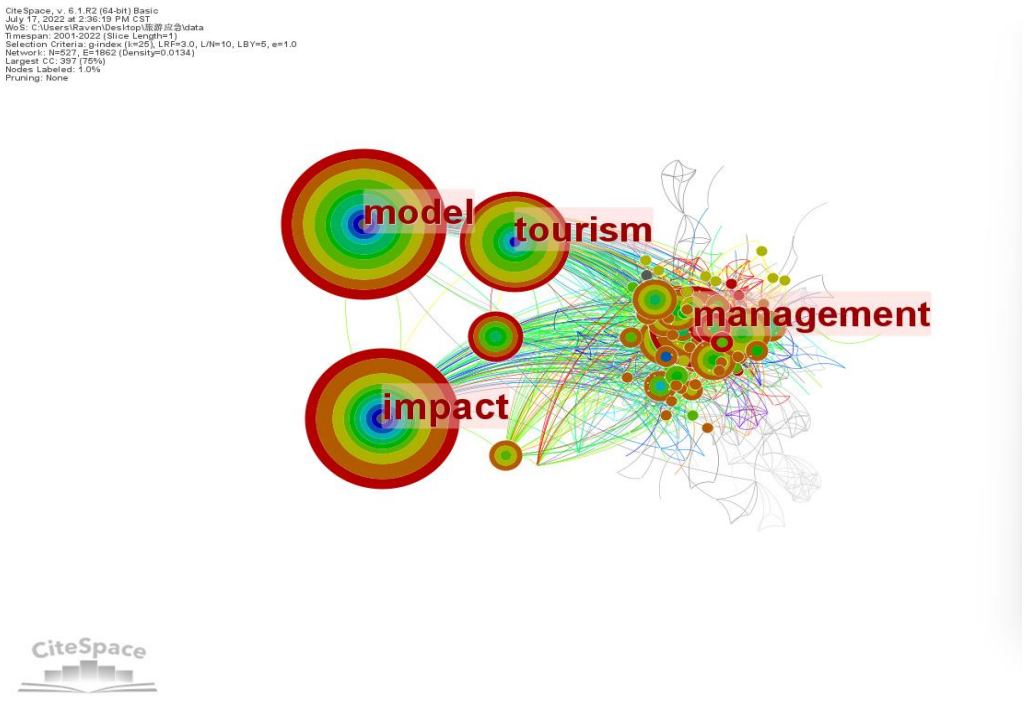

Figure 8. Keyword Co-occurrence Network of Tourism Emergency Studies (2001–2022).

Table 5. Top 5 Keywords with the Highest Frequencies (2001–2017)

NO.	Keyword	Frequencies	Centrality
1	Model	81	0.17
2	Impact	80	0.19
3	Tourism	51	0.07
4	Management	38	0.18
5	Health	25	0.07

Table 5 shows the frequency of each extracted keyword from Tourism emergency studies. The top 5 keywords are "Model", "Impact", "Tourism", "Management" and "Health". From Figure 8 we can see that the five keywords we listed are closely related to other keywords. And there are high Centrality about the five Keywords. Therefore, analysis on the current research hotspots must begin from these Keywords.

The time-zone view in CiteSpace can indicate the time as to when and how long a topic has become prevalent, and cluster related keywords together to form a whole and name it. Please see Figure 9 for details. We can see that many nodes are clustered on the time axis by CiteSpace. Looking from left to right, we can see when the relevant nodes have been studied, the connections with nodes on the same axis and nodes on different axes, Finally CiteSpace named nodes on the same axis based on algorithm and experience. Figure 9 shows that simulation, emergency medicine, and risk have long been discussed in Tourism emergency research. Most of the latest articles are related to the new coronavirus. we can see that the cluster ranked first was Social Impact (#0). This knowledge cluster contains studies on impact, knowledge and satisfaction, economic impact and city, and so on. This cluster contained 98 articles.

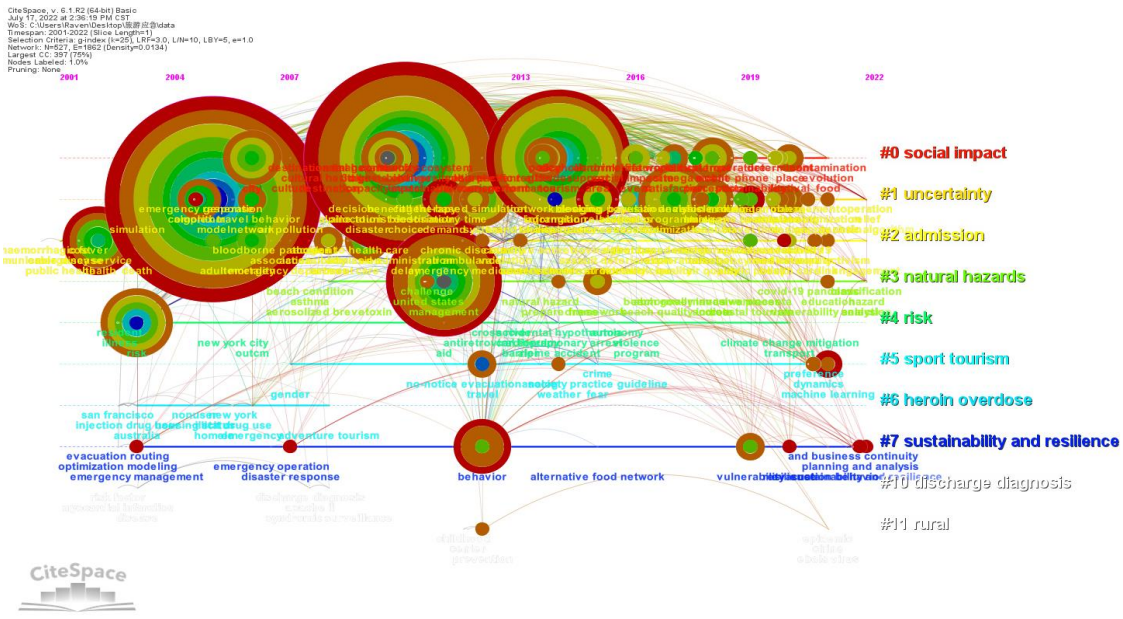

Figure 9. Cluster View of the Keywords and Cluster Name (2001–2022).

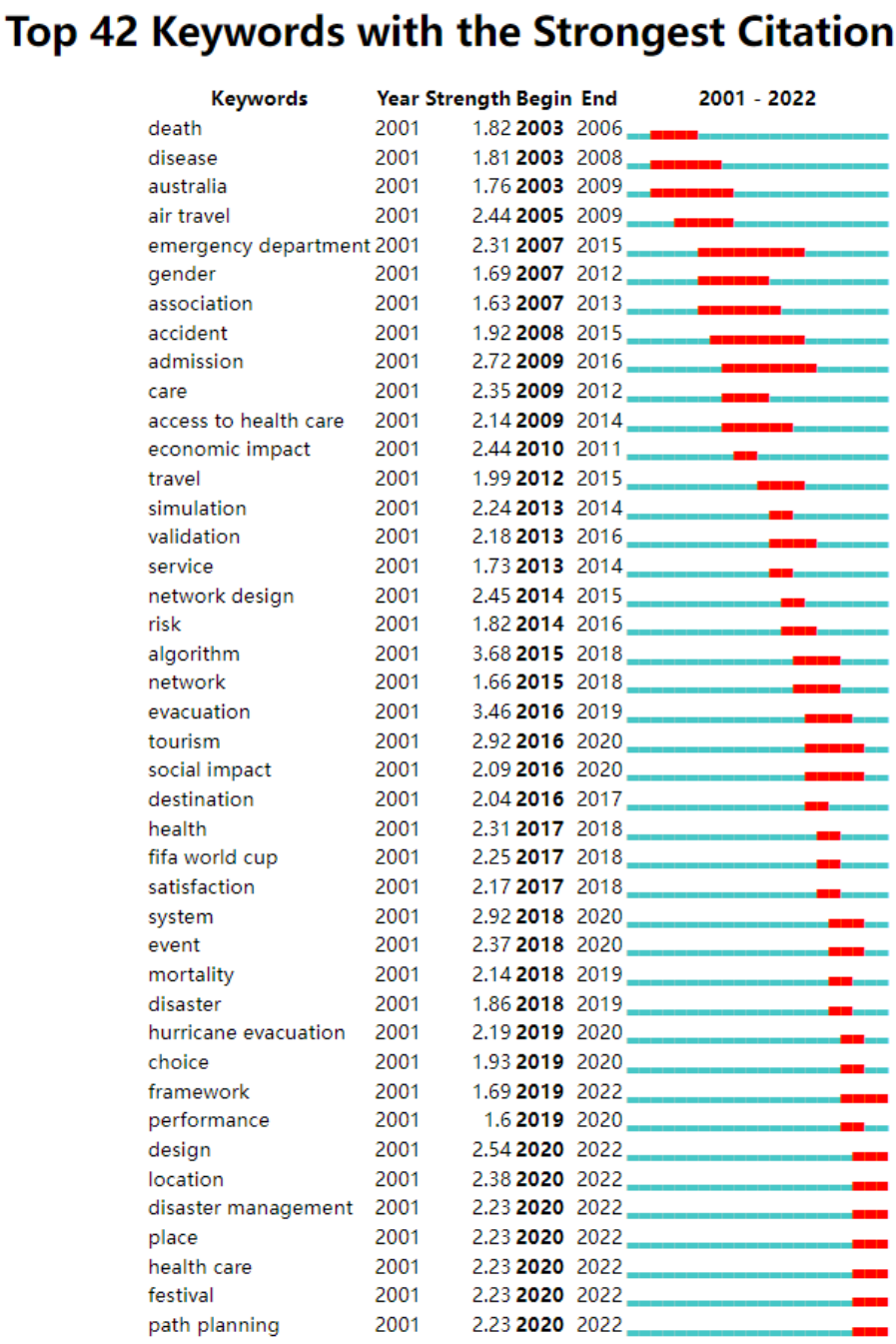

Figure 10. Keywords with Strongest Citation Bursts in Chronological Order (2001–2022)

Figure 11. Keywords with Strongest by Intensity (2001–2022)

Figure 10 and Figure 11 are the sorting diagrams of 42 keywords by different methods, Figure 10 is the sorting according to the year in which the keywords appeared, and Figure 11 is the size of the burst intensity. We can see that the earliest citation burst keyword is "death" with an intensity of 1.82, starting in 2003 and ending in 2006, followed by "disease", "Australia", "air travel" and so on. The keyword with the highest outbreak intensity is "emergency department", with an intensity of 2.31. The outbreak started in 2007 and ended in 2015. The length span is also very long, and the ranking of intensity is followed by "admission", "accident", "Australia" and so on.

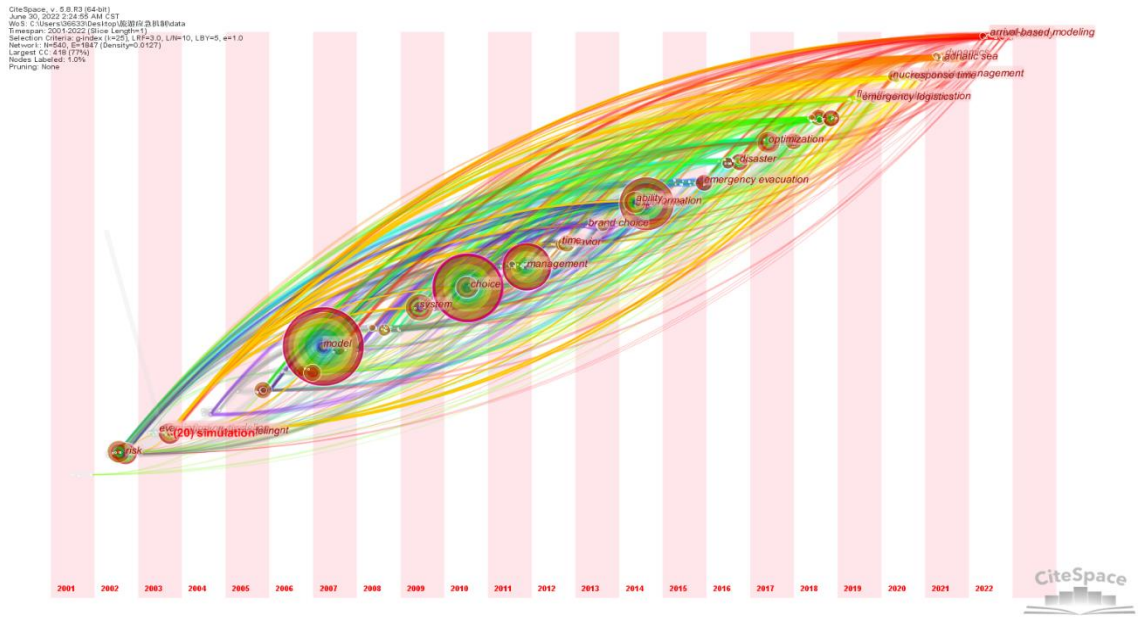

Figure 12. Time-zone View of the Keywords and Cluster Name (2001–2022)

During this time period we would like to work on identifying and analysing long-term risks to human life and property from natural or man-made hazards; taking steps to eliminate these risks where feasible and reduce the likelihood and magnitude of their impact where not feasible. Kop et al.(2003) studied various risk factors for medical emergencies in sick travelers. Stephen (2019), Golshani (2019) and Elisa (2020) have studied the evacuation behavior in emergency situations, which provides relevant evacuation policy reference for emergency management in tourism events.

Golshani (2020) applies the unannounced emergency evacuation demand model to tourism behavior, studies its impact, and proposes effective strategies to mitigate losses in emergency situations. Çakar and Kadir (2018) find by analyzing actual data from a travel case critical success factors such as responsiveness, shared roles, strategy development and collaboration are critical to effective crisis management. The study also highlights that in areas of synergy and collaboration, including features such as coordination, communication, cooperation and knowledge transfer, stakeholders have proven to be ineffective, thereby hindering the development of necessary strategies for crisis management and recovery processes. In addition, ineffective governance adopted by local stakeholders has had a significant negative impact on the process of developing an effective crisis management strategy in the future. Almobaideen et al. (2017) Introduced an IoT architecture that connects visitors with health concerns to nearby medical centers and proposed a method to find the best geographic routes for healthcare centers. Jie Liu et al. (2017) propose a multi-factor travel forecasting framework that incorporates complex factors of market conditions and individual customer characteristics to predict individual travel needs of airline customers including emergency management needs. Couling et al. (2014) studied in the coastal tourism environment and found that participants' risk perception was inaccurate, highly dependent on early warning systems, low preparedness, and lack of understanding of

natural tsunami early warning signals. Pennington-Gray et al. (2011) found resource allocation has a greater impact on whether an organization participates in crisis planning and communication processes than does crisis experience. Deanne K et al. (2010) explored the volcanic risk and tourism sector in southern Iceland and the complex challenges emergency management officials face in developing effective volcanic risk mitigation strategies.

The above are all related scholars' research and discussion on tourism emergency. We can find that the emergency situation during travel is inseparable from diseases and natural disasters. We cannot absolutely control and stop these two, so we can only fully understand and know them, do prevention, and be prepared for emergencies. A major feature of tourist scenic spots is the large flow of people. In response to this problem, many scholars have put the problem of crowd evacuation into their own research to provide emergency plans for tourism emergencies. This is a method to study the thing itself and solve the problems arising from the thing from the characteristics of the thing. Therefore, we must first understand the characteristics of the tourism industry itself, so as to better develop the tourism industry and make a better emergency system.

Research Conclusions and Implications

Research in recent years has shown that tourism emergency is still in a developing stage, and we can see from the literature diagrams that there is a big gap between the number of articles per year and the ideal number of articles. Our current core is to dig out new angles, new problems and new methods in the tourism emergency system, not just let it stay in the method of crowd evacuation and case analysis. It can be seen from the articles in recent years that the field of tourism emergency is multidisciplinary, the tourism ecosystem itself is a complex existence, and the people who are the tourism executors also have unknown problems. So it contains philosophical questions. The solution is not only the difference of policy logic, it also has a certain mathematical logic.

Through the impact of the 2020 novel coronavirus (COVID-19), the world is in a period of sound and development of emergency management. In the context of tourism, this article puts forward the following suggestions:

(1) Fully understand the impact mechanism of special problems in the tourism ecosystem, and learn to actively protect tourism destinations. Further refine the functional zoning of tourist destinations to spread out the crowds. Facilitate the evacuation of people in emergency situations. Avoid secondary injuries in the face of disasters.

(2) People should learn how to survive in an emergency, not just what happens during travel. People's awareness and thoughts play an absolutely critical role in emergencies.

(3) System makers need to make adequate and effective awareness activities through past experience and data. Learn about the field of disaster, natural disaster and emergency planning as well as an analysis of previous travel disaster planning studies. Make the right institutional theory. Think holistically, prepare and respond in stages.

However, this research has several shortcomings. First, the database is insufficiently extensive because

only the Web of Science was used as data source. Therefore, a few important journals in this area may be excluded. Second, the adopted tool could not perform all functions and only acted as a facilitator. Therefore, researchers should manually interpret the related keywords after detecting them. In addition, the subjective judgment of these researchers may introduce certain biases. This exploratory review also analyzed the tourism emergency literature using the computational technique. Therefore, the generated maps and charts may inaccurately report the findings. Future research may incorporate other techniques, such as Gephi, MapEquation, and Netdraw, to report findings in a comprehensive manner. Lastly, Due to the limitation of subject words, different language habits may have different subject words. And due to the limitation of the literature library, only the English articles were reviewed.

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