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Online Media Attention to Coal Mine Disasters: An Analysis Based on the Issue Attention Cycle

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Abstract

The study examined the longitudinal development of coal mine disasters reported in news media in China. Around Issue Attention Cycle, issue competition (Issue Competition) and issue fatigue (Issue Fatigue) provides a way to analyze and explain the periodic changes in coal mine disaster reporting. The study indicates that media attention on coal mine disasters is low. The empirical results reveal that media attention goes through four stages of issue attention cycle model: the pre-problem stage, alarmed discovery and euphoric enthusiasm stage, decline in intensity of interest stage as well as post-problem stage. Applying scan statistics approach issue competition and issue fatigue are confirmed as the factors driving the fluctuation of media attention on coal mine disasters. Implications related to media agenda setting and public opinion on safety production were discussed based on the conclusions.

Keywords: media attention cycle, issue attention cycle, scan statistics, coal mine disaster, China

1. Introduction

China's coal resources make up over 96% of its total confirmed fossil energy reserves. It is the largest producer of coal globally, with more than 20,000 coal mines. The safety conditions in the coal industry are the most critical among all industrial sectors in China. Coal mine accidents and fatalities consistently represent a significant portion of the country's overall production-related incidents and casualties. Besides bringing great pains to the victims and their family members, coal mine disasters may also create public risk perception to coal industry and lead to over-reaction to industry development through disaster communication. Because coal mine disasters generally have a limited number of victims and eyewitnesses who experience the disaster directly, most people learn about the disaster through news coverage by broadcast (television and radio), print (newspapers and magazines), and online channels (news websites, blogs and tweets). Hence effective communication is one of the key points in coal mine disaster management.

Disasters are primarily communicated through news media, which serves as a crucial channel for disseminating relevant information to the public. The news media is frequently regarded as an effective means of conveying important messages to a broad audience (Wester, 2009). Reducing influences caused by disasters is vital to disaster management (Armenakis and Nirupamab, 2013; Zhou and Hu, 2015). The media agenda exerts considerable influence on the perceived importance of issues and shapes public opinion regarding those issues (Carroll and McCombs 2004). Research in the field of disaster communication suggests that the volume of newsworthy content significantly impacts disaster relief efforts, the dissemination of disaster-related information, and the public's perception of risk (Kim et al., 2022). Furthermore, the news media are obligated to make decisions regarding the selection and prioritization of information they disseminate in order to meet the public's demand for information pertaining to a disaster (Seeger et al., 2003).

The issue attention cycle model stresses that public attention and media attention on certain issues are not constant, but vary greatly over time (Downs 1972; Hilgartner and Bosk 1988). Downs' issue attention cycle model underlines that the media attention on ecological matters includes five stages. And subsequent research confirms that the issue attention cycle model is applicable for other issues such as homeland security issues, travel safety issues and international terrorism (Bellavita, 2007; Hall, 2002; Petersen, 2009). Current research states that issue competition and issue fatigue can be seen as two factors that account for the fluctuation of media attention (Djerf-Pierre, 2012). Previous attempts on issue attention cycle only make descriptions of the evolution of coal mine disaster on public issues, lack empirical evidences on the discussions on factors that driving fluctuation of issue attention.

In the content of coal mine disasters, the study addresses these questions. Dose the media attention on coal mine disaster presents cyclicity similar to the issue attention cycle model? And what are the characteristics of media attention on such disasters? As well as what are the factors driving the fluctuation of media attention? The historical trends and levels of media coverage regarding coal mine disasters may significantly influence public awareness and the efficacy of disaster communication strategies. The research makes contribution to the effective

disaster communication.

The subsequent sections of the article are structured in the following manner. In the subsequent sections, we first review literature about online media in disaster communication, issue attention cycle, issue competition and issue fatigue. The method selection and data collection are presented in the Methodology and Sample section. The Results and Discussion section delineates the data analysis and explores the media attention cycle pertaining to coal mine disasters. The concluding remarks are presented in the final section of the article.

In conclusion, the research aim is to improve the understanding of how the media reports on the coal mine disaster, how the public learns about the disaster through media coverage, and how such reporting affects public awareness and policy making through empirical research.

2. Literature Review

2.1 Online Media in Disaster Communication

Research on disaster communication has drawn much scholarly attention. Most previous research involving disasters and news media has concentrated on the areas as followings: the crisis communication strategy, the functions of the media in disaster scenarios, the accuracy of narratives, and other related aspects during such occurrences (Arai, 2013; Vasterman et al., 2005; Perez-Lugo, 2004; Littlefield and Quenette, 2007; Hansson et al. 2020). In the context of disaster scenarios, it is essential to deliver prompt assistance and address the heightened public demand for information regarding the extent of the disaster, public safety measures, rescue and relief efforts, as well as governmental responses (Keselman et al., 2005). The media serve a crucial function in disseminating essential information to the local community, national and even international citizens in disaster situation (Ogie et al., 2022).

Since the mid-1990s, when the World Wide Web gained widespread popularity, it has facilitated the connection of individuals with shared interests (Kodrich and Laituri, 2005). In contrast to conventional communication methods, such as telephone lines, the Internet has the advantage of disseminating disaster information with an almost unlimited capacity and administrating the large amount of information after a disaster (Munawar et al., 2022). With the more popular of Web news, as a result more newspapers and television news programs and other news sites have created online websites to issue news. The reach of Web news has been growing of the newspapers and television websites and of other news sites. Immediately following certain major coal mine disasters, the online news media created special websites containing information about relief efforts, official government statements, and news reports generated by the local media. The special websites provide news, video, picture and hyperlink about disasters which can facilitate the public to obtain comprehensive information of disasters effectively.

The internet is increasingly recognized as an interactive news platform that is transforming the function of the media. The advent of Web 2.0 technologies has facilitated a shift in media utilization during crises, transitioning from a model of unilateral communication to one characterized by multi-directional interactions among diverse audiences (Shan et al., 2014).

Numerous studies have highlighted the participatory characteristics of online media, indicating that the internet provides a platform for various stakeholders to share their ideas and perspectives in a communicative manner (Cacciatore et al., 2012). Consequently, the significance of online media in the context of disaster communication is becoming progressively more critical.

2.2 Issue Attention Cycle

The concept of issue attention cycle was originally proposed by Downs (1972) and he claimed that public attention and media attention on certain issues are not constant, but vary greatly over time in a seminal article. Utilizing environmental issues as a case study, the researcher discovered that the coverage of these topics by American news media exhibits a cyclical pattern, which appears to significantly impact public attitudes. As stated by Downs (1972) The attention cycle may be characterized by a singular peak in public interest, following which the issue diminishes and is unlikely to regain its previous level of prominence (Djerf-Pierre, 2012). This sequence of occurrences elucidates the timing of the emergence of issues within media discourse, as well as their subsequent decline in significance (Cacciatore et al., 2012).

The investigation of issue attention cycles within the media represents a multifaceted area of research that encompasses various methodologies. The majority of existing studies provide empirical evidence supporting the presence of attention cycles in media coverage. For example, the research by Bellavita (2007) found that homeland security issues do tend to follow the issue attention cycle. Hall (2002) found that in the post September 11 aftermath travel safety policies and public opinion of travel safety measures were well described by the stages of the issue attention cycle. Petersen (2009) proved that the issue of international terrorism conforms to the model as presented by Downs. Djerf-Pierre (2012) enhances the issue attention cycle framework by incorporating the notion of metacycles, thereby examining the progression of environmental news coverage. In the article, the term metacycles denotes the significant variations in public attention towards the broad spectrum of environmental concerns over time, whereas issue cycles pertains to the fluctuations in focus related to specific environmental issues.

Although Downs' issue-attention cycle has garnered significant focus within the realm of domestic political issues, it should not be presumed that the apparent lack of emphasis in disaster communication research indicates that the cycle is irrelevant to this field. We utilize the theoretical framework to analyze coal mine disasters, as their characteristics align with those initially identified by Downs, which predispose an issue to exhibit a cyclical pattern of media coverage. Primarily, it is observed that the majority of the population does not experience the problem to the same extent as a minority group. Coal mine disasters always accompany casualities, the official statistics data show that there are several thousand deaths caused by coal mine disasters. Furthermore, such events generally bring great pains to the family members of miner, and have impacts on the coal mine enterprises and local government. Although the impacted majority is absolutely large, it occupies a tiny part of the total population in China. Thus the impact scope of coal mine disasters is so finite.

Secondly, the hardships resulting from the issue are produced by social structures that confer

substantial advantages to either a predominant majority or a powerful minority within the population. Poor condition of safety production assurance, the miners' lack of safety production skills and knowledge mainly contribute to the frequent occurrences of such disasters. Poor condition of safety production assurance and poorly educated miners mean lower production cost and higher profits to the coal mine enterprises. Thus, the sufferings caused by the disasters are generated by the benefits acquisition of the enterprises that provide significant benefits to the enterprises.

Third, the issue lacks any inherently stimulating characteristics, or it may have lost such qualities over time. Coal mine disasters always accompany casualties and property loss which is neither exciting nor dramatic, but sentimental. Public attention is subject to various limitations, including temporal constraints, cognitive capacity, emotional endurance, and available material resources (McCombs and Zhu, 1995). As news values theory states that negativity of events is sometimes regarded as the basic news values (Ruprechter et al., 2023). When online media covers coal mine disasters, public attention naturally focuses upon their causes, processes and consequences. With the decrease of media coverage of the disasters, public attention will decay subsequently.

2.3 The Factors That Influence the Media Attention

Although the issue attention cycle model describes the fluctuations of issue attention on certain issues, the mechanism of the fluctuations needs further research. Issue competition and issue fatigue are identified as two significant factors that play a crucial role in the process through which issues transition from heightened visibility to diminished attention (Djerf-Pierre, 2012). News media organizations determine the selection of issues to report on and the extent of coverage that each issue receives (Reese and Ballinger, 2001), the process of selecting media is constrained by the availability of media resources. The media agenda operates as a zero-sum game, as posited by Zhu (1992), wherein the prominence of one issue on the agenda occurs at the detriment of another issue (Dwivedi et al., 2022). The capacity of news media to focus attention is constrained, as noted by Hilgartner and Bosk (1988), due to several factors. On one hand, the overall capacity of news media is inherently restricted (Geiß 2011). For instance, newspapers are constrained by their page count, television news broadcasts are restricted by the amount of airtime available, and network news media are bound by the resources at their disposal. Conversely, audience attention spans are inherently limited (Brosius and Kepplinger, 1995), which can be attributed to the finite capacity for attention among viewers (Huang and Pashler, 2005).

Limited media resources and the gatekeeping process based on news values, the aspect of individual, routine, organizational characteristics and audience oriented require news media to cover issues in a hierarchy of importance (Soroka, 2012). Therefore, different issues in real world have to compete for more salience in media agenda (McCombs, 2004). In the issue competition process, there exists a tendency for less newsworthy topics to be overshadowed by those possessing greater news value. (Djerf-Pierre, 2012). An analysis of the U.S. government's response to natural disasters occurring in foreign nations from 1968 to 2002 suggests a correlation with "other newsworthy events, such as the Olympic Games" as well as other

significant occurrences that may overshadow the media coverage of these disasters. (Eisensee and Strömberg, 2007). Djerf-Pierre (2012) examined the cyclical nature of media attention towards environmental issues, demonstrating that during periods of crisis, coverage of environmental news is often overshadowed by reports on economic matters, as well as news related to warfare and armed conflicts.

The other factor is the issue fatigue that is seen as another side of the media attention cycle. As Ungar (2000) stated that the issue fatigue is presented as the decreasing returns of actors' interest in a competitive interest economy over time. From the view of new media, issue fatigue can be regarded as an exponent of decreasing returns of newsworthiness (Djerf-Pierre 2012). Following extensive media coverage of a particular issue, journalists' interest in that topic tends to reach a saturation point. Subsequently, other news stories may gain precedence, leading to a rapid decline in attention to the initial issue within a matter of days (Vasterman et al. 2005). Scholarly research indicates that following the initial media coverage of a disaster, there is a significant decline in both the quantity and frequency of related news stories (Singer and Endreny, 1993; Vasterman et al., 2005). According to the principle of rehearsal concerning event information (Sarafidis, 2007), the public may experience issue fatigue as a result of repeated exposure to news stories pertaining to a particular issue. This phenomenon can result in a diminished transmission value and adversely affect public perception (Pantin et al., 2003; Vasterman et al., 2005).

The literature review shows that most of the current research attempts to research the media attention cycle by qualitative analysis and lack empirical study on the mechanism of the fluctuation of media attention on an issue. What is more, industrial disasters especially coal mine disasters have not attracted enough attentions and interests from mass media communication researchers. Thus this study investigates the media attention cycle and mechanism of media attention fluctuation on coal mine disasters.

3. Methodology and Sample

3.1 Methodology

3.1.1 Issue Attention Cycle Model

According to Downs, the issue-attention cycle comprises five distinct stages that unfold sequentially. The initial stage, termed the pre-problem stage, is characterized by the existence of a highly undesirable condition that has not yet garnered significant public attention, despite the severity of the issue and the concerns expressed by certain experts or interest groups. The second stage emerges as a result of a series of dramatic events that heighten public awareness and concern regarding the issue, often accompanied by a sense of confident enthusiasm about society's capacity to address the problem effectively within a relatively short timeframe. The third stage involves a gradual recognition by the public of the substantial costs associated with achieving meaningful progress on the issue. The fourth stage witnesses a gradual decline in intense public interest, as an increasing number of individuals come to understand the complexities and expenses involved in resolving the problem, or as they become disinterested

in the issue altogether. Finally, the post-problem stage is reached when the issue is supplanted by other concerns, relegating it to a state of diminished attention or sporadic re-emergence in public discourse.

Exploring the media attention cycle on coal mine disaster needs to research the longitudinal patterns of media coverage over time. Agenda setting theories indicate that when news media pays more attention to certain events, the events will get intensive coverage (Tavakolifar et al. 2021). So we use the number of Web news stories to gauge the online media attention to the disaster. To identify media attention cycle, we plotted monthly number of media stories counts.

3.1.2 Scan Statistic

The scan statistic is a widely utilized methodology for assessing the presence of clusters within a one-dimensional point process, as well as for determining whether the observed point process is purely random (Kulldorff, 1997). This statistical approach evaluates spatial, temporal, and space-time data through the application of spatial, temporal, or space-time scan statistics. Specifically, the temporal scan statistic employs a moving window along a single dimension, namely time, which is represented by the height of a cylinder. This design allows for flexibility in defining both the start and end dates of the analysis. The maximum temporal length is determined within the Temporal Window Tab. Scan statistics have been employed in retrospective analyses to identify unusual clustering patterns in various health-related contexts, including diseases, Down's Syndrome, suicide, Sudden Infant Death Syndrome (SIDS), HIV, livestock diseases, among other applications (Glaz, 2001). Furthermore, the multivariate scan statistic can accommodate various probability models by utilizing different likelihood functions (Kulldorff, 2007).

Bernoulli data can be examined using purely temporal, purely spatial, or space-time scan statistics. In the context of the Bernoulli model, cases and non-cases are denoted by a binary variable (0/1) (Kulldorff, 1997). For each specified location and size of the scanning window, the alternative hypothesis posits that there exists an increased risk within the window relative to the external area. Under the Poisson assumption, the likelihood function for a given window is proportional to:

$$\left(\frac{c}{n}\right)^{c}\left(\frac{n-c}{n}\right)^{n-c}\left(\frac{C-c}{N-n}\right)^{C-c}\left(\frac{(N-n)-(C-c)}{N-n}\right)^{(N-n)-(C-c)} I()$$

In this context, C represents the aggregate number of cases, c denotes the observed count of cases within the specified window, n indicates the total number of cases and controls present within that window, and N signifies the overall total of cases and controls within the entire dataset.

Identifying the temporal rule of media attention can help research the mechanism of media attention fluctuation. Studying the temporal clustering of the intensity of media attention on a series of coal mine disasters can help understanding the fluctuation mechanism. We then select the Bernoulli model in SatScan to undertake the research.

3.2 Data Collection

The extensive accessibility of electronic resources via the Internet, particularly through the World Wide Web, has facilitated the examination of empirical patterns concerning the characteristics of full-text electronic documents, their representations, and their utilization. Notably, there exists a diverse array of online information sources related to disasters across numerous mass media websites (Herring et al., 2004). Consequently, this presents an opportunity to explore the quantity of news articles pertaining to a disaster that can be automatically generated from current online resources (Thelwall and Hellsten, 2006).

There are two data sets in our research. The first data set is the number of news coverage on the issue, namely coal mine disaster. The second data set is the number of news coverage on a series of coal mine disasters. The pertinent coal mine disasters are documented on the website of the State Administration of Work Safety (SAWS) (http://www.chinasafety.gov.cn/newpage/) within the comprehensive list for the entirety of China. The SAWS is a governmental agency that operates under the direct oversight of the State Council and is tasked with ensuring work safety. In each province and major city across mainland China, the SAWS has established subsidiary agencies. These subsidiaries are responsible for monitoring the work safety practices of local governments and for promptly disseminating new information regarding work safety to the SAWS. The SAWS website serves as a platform for the timely release of work safety information and for promoting a culture of safety among the public. Especially serious disasters and serious disasters that cause more than 10 deaths are the sample in the study. We collected all 222 especially serious disasters and serious disasters from the website of SAWS.

A search engine provides a convenient tool to collect data for disaster recognition and information monitoring. Baidu engine is the largest one in Chinese language. We then selected the Baidu news to take advantage of its large coverage of content being searched. Baidu news contains almost all of the network news released by the news media in China. Thus the data news stories were searched by the Baidu news engine (http://news.baidu.com). We obtain the number of news coverage by Baidu news search engine from 2003 to 2012. For example, we input the keywords “coal mine disaster (in Chinese)” to the search engine and set date from 2003-1-1 to 2003-1-31 to get the monthly news coverage on the issue.

We also through Baidu news search engine get the number of news coverage on a coal mine disaster. In order to obtain the news stories on a coal mine disaster as many as possible, this study focuses on stories appear on the Internet in six months after a coal mine disaster happens. For example, we input the disaster keywords “Gaoqiao coal mine (in Chinese)” to the Baidu news search engine and set date from 2008-1-18 to 2008-7-18. Using the method, we get the number of news stories related to the disaster.

4. Results and Discussion

We use descriptive analysis to examine the media attention cycle of coal mine disaster, and the mechanism of media coverage fluctuation by the software SaTScan v9.1.1.

4.1 The Media Attention Cycle in Coal Mine Disaster

As shown in Figure 1 the monthly number of news stories on coal mine disasters fluctuates sharply. The rolling line indicates that media attention on the issue is not constant and varies over time. The result indicates that the baseline level of news stories was low throughout the past 10 years. And we can classify the interval into four stages: the first stage is the 2003, the second stage is from 2004 to 2005, the third stage is from 2006 to 2009, and the fourth stage is from 2010 to 2012.

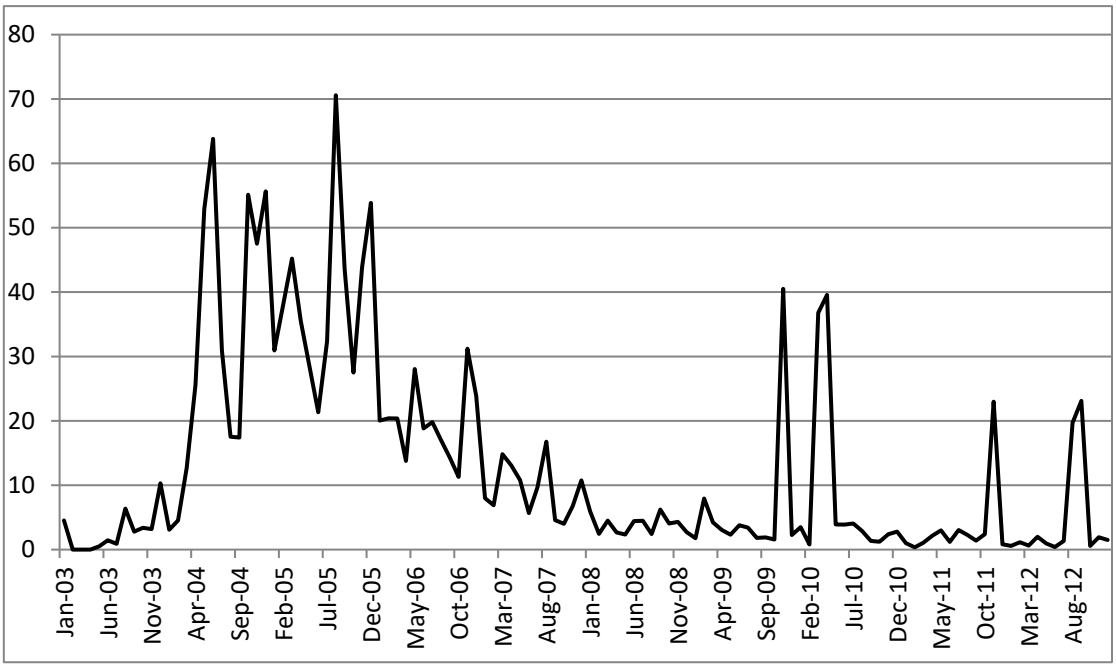

Figure 1. The Monthly Number of News Stories on Coal Mine Disaster

Note: Due to the different level of network resources development in the different periods, the monthly number of news stories is revised by dividing the monthly number of webpages.

In the first stage namely the year of 2003, the number of news stories is low and there are three months in the year that the number of news stories is zero. It means that most coal mine disasters can not attract enough media attention in 2003. Although the situation of coal mine safety production management is serious in the period, the issue has not yet captured a significant amount of media attention, not necessarily because the issue is not grave, but due to a lack of perception or awareness of it. Thus we can regard the stage 2003 as the pre-problem stage in the issue attention cycle model.

In the second stage from 2004 to 2005, the number of news stories keeps relatively higher than other stages. It indicates that the issue arouses wider media attention. In the interval from 2004 to 2005 the coal mine disaster is the most serious in China in our research. Especially in 2005 there are 1574 deaths and the year is regarded as “the year of coal mine disasters”. As a result

of some dramatic series of such disasters the media suddenly becomes both aware of and alarmed about the evils of the issue. Subsequently the issue arouses more media attention and stricter governmental supervision. In September 2005, the State Council issued specific regulations aimed at preventing safety accidents in coal mine production. These regulations are designed to facilitate the timely identification and rectification of potential safety hazards, enforce accountability for coal mine safety, avert disasters related to coal mine production, and protect the lives of workers as well as the overall safety of coal mining operations. Consequently, the period from 2004 to 2005 can be characterized as a phase of heightened awareness and enthusiastic engagement within the issue attention cycle model.

In the third stage from 2006 to 2009, the number of news stories decreases rapidly. Although the situation of coal mine disasters has got obvious improvements after 2005, the safety of coal mining still is a serious issue compared to the coal mining developed countries. The megaton coal mortality of China is dozens of times higher than the United States and South Africa. Because of the poor condition of safety production assurance solving the issue is a long-term process and has high cost. Then the media and public are concern fatigue of the issue, and then the media attention on the issue declines rapidly. Thus we can regard the stage from 2007 to 2009 as the decline in intensity of interest stage in the issue attention cycle model.

In the fourth stage from 2010 to 2012, the number of news stories is relatively stable and low except for certain points. The points are November 2009, march 2010, April 2010, November 2011, August 2012 and September 2012. In the aforementioned time there are either more serious or more frequent coal mine disasters than other time in the same year. For example, on November 21, 2009 a massive coal mine disaster causing 108 deaths aroused a huge sensation in China. The tragic event attracted many journalists from all the levels of news media and the total number of news stories reached to 9970 pieces. The result indicates media attention on the issue is driven by the events related to coal mine disaster. In addition to media attention to the issue moves into a prolonged “twilight realm of lesser attention” with spasmodic recurrences of low to moderate interest. Thus we can regard the stage from 2010 to 2012 as the post-problem stage in the issue attention cycle model.

4.2 The Mechanism of Media Attention Fluctuation

Table 1. The Temporal Clustering of Excessive Coverage

Time frame	Observed/expected	Relative risk	Log likelihood ratio	P-value
2004/11/13~2004/11/28	4.43	4.00	5.075683	0.067
2005/11/11~2005/11/25	2.67	3.14	4.233416	0.219
2006/11/25~2006/11/29	1.94	2.21	2.903690	0.060
2007/3/27~2007/3/28	2.27	2.56	1.753702	0.093
2008/7/12~2008/12/17	1.74	5.42	6.320740	0.047*
2009/5/30~2009/6/17	2.80	4.00	2.376570	0.329
2010/3/1~2010/3/28	3.60	5.33	2.913919	0.331
2011/4/15~2011/5/29	3.00	4.33	2.525059	0.413
2012/8/29~2012/9/2	2.75	4.50	2.442944	0.325

*$p<0.05$

We then select the Bernoulli model in SatScan to test the temporal clustering of media coverage on coal mine disasters. First, we test the temporal clustering of excessive coverage. The start time and end time of the time frame are the occurrence time of a coal mine disaster. In table 1 only the p-values of the time frame from 2008/7/12 to 2008/12/17 is less than 0.05 which means that in the interval the temporal clustering of excessive coverage is significant.

Secondly, we test the temporal clustering of weak degree of coverage. The analysis results are shown in Table 2. The start time and end time of the time frame are the occurrence time of a coal mine disaster. In table 2 only the p-values of the time frame from 2008/4/12 to 2008/7/10 is less than 0.05 which means that in the interval the temporal clustering of weak degree of coverage is significant.

Table 2. The Temporal Clustering of Weak Degree of Coverage

Time frame	Observed/expected	Relative risk	Log likelihood ratio	P-value
2004/6/9~2004/9/9	1.29	1.47	2.798130	0.311
2005/4/26~2005/5/12	1.60	1.72	2.522018	0.78
2006/10/24~2006/10/28	2.06	2.29	2.315809	0.129
2007/5/23~2007/5/24	1.79	1.92	1.227606	0.152
2008/4/12~2008/7/10	1.92	3.00	5.851419	0.037*
2009/4/17~2009/5/16	1.56	1.83	1.545490	0.70
2010/5/13~2010/8/3	1.38	1.83	3.056059	0.132
2011/10/4~2011/10/29	1.50	2.25	3.365058	0.125
2012/9/6~2012/9/25	1.57	2.00	1.665122	0.485

*$p<0.05$

The results of table 1 and table 2 indicate that in the time frame from 2008/4/12 to 2008/7/10 the news media tend to cover weak degree of coverage on coal mine disasters, in the time frame from 2008/7/12 to 2008/12/17 the news media tend to cover excessive coverage on such disasters. And we find that there is no significant temporal clustering of intensity of media coverage on coal mine disasters in the remaining years.

In 2008 there are two significant events which draw much media attention. On May 12, 2008, a seismic event of magnitude 8 occurred in Wenchuan County, located in Sichuan Province, China. According to official statistics released on July 21, 2008, the disaster resulted in 69,227 confirmed fatalities, 374,643 injuries, 17,923 individuals reported missing, and left approximately 4.8 million people without shelter (Ministry of Civil Affairs of China, 2008). Subsequently, the 29th Olympic Games took place in Beijing on August 8, 2008. The two significant issues are the focuses of the public attention and media attention and they are more newsworthy to media in 2008. Because of the limited media resources the news on coal mine disasters is crowed out by other newsworthy issues. Thus the negative events including disasters could not attract more concerns from the news media than the earthquake and Olympic Games.

Subsequently, with the decreased damages of earthquake and the diminishing enthusiasm of the 2008 Beijing Olympic Games, the two issues are less newsworthy for news media and public. Thus there are more media resources for other issues. And the negative events could arouse more media attention from news media. The intensity of media coverage tends to be excessive coverage in the time frame from 2008/7/12 to 2008/12/17. A reasonable interpretation is that in the second half of 2008 a large proportion of the news organizations cover coal mine disasters that causes the accumulational coverage on the disasters.

5. Conclusions and Limitations

Effective communication after disasters is a key issue. Because of the frequent occurrence of coal mine disasters in China, improving the effective communication after such disasters is very significant. Utilizing Down's theory of cyclic patterns of issue attention, our analysis revealed that the preceding decade exhibited minimal media coverage concerning coal mine disasters. We provided empirical evidence supporting the existence of issue-attention cycles in the media's reporting on coal mine disasters; however, we did not identify evidence that substantiates the presence of sequentially occurring stages of attention. Our findings indicate that these issue-attention cycles were triggered by events pertinent to the issue at hand. And the study also found that the issue competition and issue fatigue are the factors that cause the fluctuation of media attention on coal mine disaster. The news on coal mine disasters in that research period is crowed out by the Wenchuan earthquake and Beijing Olympic Games. After that the crowding out effect disappears. The empirical result confirms to the crowding out effect of issue competition theory which is consistent to the consequences of some scholars (Eisensee and Strömberg, 2007; Djerf-Pierre, 2012). The study provides empirical evidences of two factors—issue competition and issue fatigue, on the fluctuation of media attention.

The extent of media coverage significantly affects public perception regarding the significance and relevance of a particular issue. Deficient coverage cannot make the public attach importance to the issue. More media attention on a disaster can make more damages to the coal mine corporation and intense consensus in the public which is may result in serious processing to the officials and strict supervision on the corporation. Historical levels and patterns of attention to coal mine disasters in the media may have implications for public awareness and effective disaster communication. By the analysis on the stage of media attention cycle on the coal mine disaster, the decision makers can judge the trend of media attention on the issue roughly which is useful for predicting the trend of public attention. The issue attention cycle model describes the media and public attention from the pre-problem stage to the increase of attention on the issue, with the attention reaches the highest it enters to the decline in intensity of interest stage and then the post-problem stage. The decision makers can release the news stories conforms to the issue attention cycle model can help the public have a relatively complete understanding process about the issue and affect the public agenda.

The present study validates the issue attention cycle model; however, a comprehensive understanding of the complete trajectory of attention towards a specific issue necessitates a more thorough qualitative analysis of media content. This research focused exclusively on the

attention cycle associated with a singular topic within news media. Future investigations could explore various types of disasters reported across multiple media sources, thereby assessing the extent to which the attention cycle varies or shares commonalities with other disaster scenarios.

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