

FRAME CONSTRUCTION AND COMPETITION: NEW MEDIA COVERAGE OF PM2.5 ISSUE IN CHINA

กรอบการนำเสนอข่าวและการแข่งขัน: ประเด็นมลพิษทางอากาศ (PM2.5) ในสื่อใหม่ของจีน

He Man¹ and Sukanya Sereenonchai²

¹School of Journalism and Communication, Hebei University, P.R. China

²Faculty of Environment and Resource Studies, Mahidol University

Received: September 29, 2018 / Revised: December 11, 2018 / Accepted: February 26, 2019

Abstract

This research focused on new media coverage of PM2.5 to analyze the interweaving and competition of media power. News framing theory and the empirical method were adopted to analyze the contents of Xinhua Net, The Paper.cn, and China Science and Technology Network reported from June 1, 2016 to June 1, 2018. Firstly, the differences and changes of PM2.5 issue were analyzed from the theme frame. Xinhua Net's reports mainly focused on *Institution Theme*, The Paper.cn focused on *Event Theme*, and China Science and Technology Network evenly distributed about themes. Secondly, the leader in PM2.5 news frame was analyzed from information sources. Government officials were the main frame definers, and held the power of information dissemination. Thirdly, the study found significant differences in media discourse. Xinhua Net's frame emphasized *National Policies* and resorted to *Administration*. Both The Paper.cn and China Science and Technology Network reflected *The Daily Life of Public* and resorted to *Science and Technology Governance*. Finally, the analysis of frame leading, resonance and diffusion process was carried out. The three websites followed peak-valley pattern. When the topic of PM2.5 went to the peak, they chose the relatively close reporting frame and cited the similar information sources, so as to increase the number of reports and present a peak. In the construction of PM2.5 news frame, Xinhua Net was the leader and definition provider. The Paper.cn played an important role in promoting media interaction and the resonance and diffusion of the frame, while China Science and Technology Network was in the process of follow-up on news presentation.

Keywords: PM2.5 issue, Frame construction, Frame competition, New media

Corresponding Author

E-mail: sukanya.ser@mahidol.ac.th, ssereenonchai@gmail.com

บทคัดย่อ

การศึกษานี้เน้นวิเคราะห์และอภิปรายการกำหนดกรอบการนำเสนอข่าว PM2.5 ของสื่อออนไลน์ 3 สำนัก คือ Xinhua Net, The Paper.cn และ China Science and Technology Network เพื่อวิเคราะห์การผสมผสาน และการแข่งขันของอำนาจสื่อ การศึกษานี้ประยุกต์ใช้ทฤษฎีการกำหนดกรอบการนำเสนอข่าวและวิธีการเชิงประจักษ์ ในการวิเคราะห์เนื้อหาข่าวที่นำเสนอตั้งแต่วันที่ 1 มิถุนายน 2559 ถึง 1 มิถุนายน 2561 ข้อค้นพบที่น่าสนใจคือ 1) ความแตกต่างและการเปลี่ยนแปลงของประเด็น PM2.5 โดยวิเคราะห์จากกรอบการนำเสนอแต่ละประเด็น Xinhua Net เน้นเสนอประเด็นเชิงสถาบัน The Paper.cn เน้นเสนอประเด็นเชิงสถานการณ์ และ China Science and Technology Network เน้นเสนอประเด็นหลากหลาย 2) ผู้นำในกรอบข่าว PM2.5 ได้รับการวิเคราะห์จาก แหล่งข้อมูลพบว่า เจ้าหน้าที่ของรัฐเป็นผู้กำหนดกรอบหลักและมีอำนาจในการเผยแพร่ข้อมูล 3) การศึกษาพบ ความแตกต่างอย่างมีนัยสำคัญในวาทกรรมสื่อ Xinhua Net เน้นนโยบายแห่งชาติและการบริหาร ขณะที่ Paper.cn และ China Science and Technology Network สะท้อนชีวิตประจำวันของสาธารณชนและการกำกับดูแล ทางวิทยาศาสตร์และเทคโนโลยี 4) การวิเคราะห์ผู้มีบทบาทในการกำหนดกรอบการนำเสนอข่าว เสียงสะท้อน และกระบวนการแพร่กระจายข่าว พบว่า ทั้ง 3 เว็บไซต์นำเสนอตามรูปแบบยอดเขา กล่าวคือ เมื่อประเด็น PM2.5 ไปถึงจุดสูงสุด นักข่าวเลือกการรายงานอย่างใกล้ชิดและอ้างอิงถึงแหล่งข้อมูลที่คล้ายกันเพื่อเพิ่มจำนวนครั้งในการรายงาน และนำเสนอประเด็นสูงสุดที่น่าสนใจ ในการกำหนดกรอบการนำเสนอข่าว PM2.5 Xinhua Net เป็นผู้นำและผู้ให้ความหมาย Paper.cn มีบทบาทสำคัญในการส่งเสริมปฏิสัมพันธ์ของสื่อมวลชน การสะท้อนและการแพร่กระจายของ กรอบการนำเสนอ ขณะที่ China Science and Technology Network เป็นผู้ตามในการนำเสนอข่าว

คำสำคัญ: ข่าว PM2.5 การกำหนดกรอบการนำเสนอ การแข่งขันในการกำหนดกรอบข่าว สื่อใหม่

Introduction

Since 2011, China has encountered immense problems of haze on a vast scale. The air pollution in Jing-Jin-Ji, a corruption of Chinese word for Beijing-Tianjin-Hebei Province, is the most serious. The air quality is so poor that causes great trouble in community's daily life and makes a great impact on dwelling's respiratory system.

PM2.5 refers to the particle size of the suspended in the air particulate matter less than or equal to 2.5 microns. From a purely professional term to a public issue, mass media should play an important role in the construction process of PM2.5 issue.

Media discourse is not only used as communication, but also a symbolic power (Bourdieu, 1991). Media of different camps are influenced by different values and power structures, and then show differences in themes and frames, so as to reflect the interweaving and competition of power (Zeng, Dai & Zheng, 2013).

Research Objectives

This study attempts to investigate: 1) What are the theme frames of media from different standpoints to report PM2.5 issue?; 2) Who is the leader of the framework?; and 3) How do media from different standpoints link with each

other in the diffusion process of PM2.5 issue framework?

Literature Review

News framing theory can be used to examine how issues are presented and interpreted in the news (de Vreese, 2005). Framing is a process in which news media construct reality for their readers. Through a framing process, some perspectives of a reality are selected and focused prominently but others are omitted (Entman, 1993). To understand the news framing for broadcasting PM2.5 issue, the inductive framing approach, which loosely defined pre-suppositions of the frames in order to identify all possible frames, and the frames emerge during conducting the content analysis, was employed for the content analysis (Semetko & Valkenburg, 2000).

Not every environmental issue can be shown in the media as a public issue. Whether it can be successfully transformed to a public issue is not only an environmental issue itself, but also a media contribution to the construction of environmental issues. Therefore, it is of great significance to study the process of media constructing environmental issues.

In this process, frames are usually used to analyze environmental reporting, which provides a story mode to present an event and a vague objective (Xu, 2012) That is to say, a framing analysis can be used as a tool to analyze media coverage (Entman, 2007). Meanwhile, frames are determined by some factors. For example, media are very important to construct frames (Dispensa & Brulle, 2003).

Bao (2012) found that media coverage of PM2.5 broke the original paradigm of traditional environmental reporting and presented a trend of normalization and rationalization in recent years. Using the frame of the constructivist paradigm, Zhuang (2014) examined the presentation mode of major media on haze issues in China from 2011 to 2014 and constructed a multi-dimensional frame analysis theoretical structure.

There are differences in the coverage of environmental issues by different media in different countries, and there are also some differences among different types of media within a nation state. Through the analysis of three different types of daily newspapers in China. Zeng, Dai & Zheng (2013) believed that they had frame competition, resonance and diffusion on the emerging climate change issues. At the same time, environmental communication also contained the possibility of Living Politics. Jin (2014) presented in *Daily Environmental Struggle* form of PM2.5 issue and constituted a new protest political drama in social media. China was ranging from a *Struggle Role* to a role of *Ecological Public Opinion Guide* in this process. Meanwhile, Wu (2014) took PM2.5 issue as an example to systematically discussed the role of media in the construction of environmental issues. Liu (2017) mentioned that the emergence of PM2.5 issue was a profound act of intellectual empowerment. Researchers grasped the concept of haze and its environmental idea through the identification of PM2.5, and then discussed the *Formation Mechanism of Ideas*.

Research Methodology

The research took PM2.5 reports of three news websites as objects, including Xinhua Net, The Paper.cn and China Science and Technology Network, and used empirical method to analyze the content of the samples.

Xinhua Net is a representative national key news website. The Paper.cn, a new media website owned by Shanghai Newspaper Group, is mainly market-oriented. Although it is a local media, it has a national reputation. A nonprofit research network, China Science and Technology Network is under the leadership of the Chinese Academy of Sciences, which has a certain authority in comprehensive science and technology news and information dissemination network.

The three news websites separately represent the authorities of the government, the market, and science and technology. These can help to further analyze the differences on PM2.5 issue in different types of Chinese media.

This study purposed to analyze the content of reports on PM2.5 issue on three websites, so it involved the choice of time periods. The State Council issued specific control plans for water, air and soil on June 1, 2016. PM2.5 was taken as the keyword and the search functions of the three websites were respectively used to query from June 1, 2016 to June 1, 2018. Getting rid of irrelevant reports and repetitive information, Xinhua Net had 124 news reports, The Paper.cn had 135 news reports, China Science

and Technology Network had 65 news reports.

Content analysis was employed to analyze PM2.5 news in order to learn about news reporting approaches and to understand news framing. The unit of analysis was a news story mentioning PM2.5 in its headline and/or news content. Beside the news content, photos and captions in the news, if portrayed and explained, were also analyzed for their framing.

In the research method, the theme frame, sources of information, frame comparison, frame leading, resonance and diffusion of PM2.5 issues of three websites were analyzed respectively.

Research Results and Discussions

1. Theme frame: differences and changes in PM2.5 issue among the three news websites

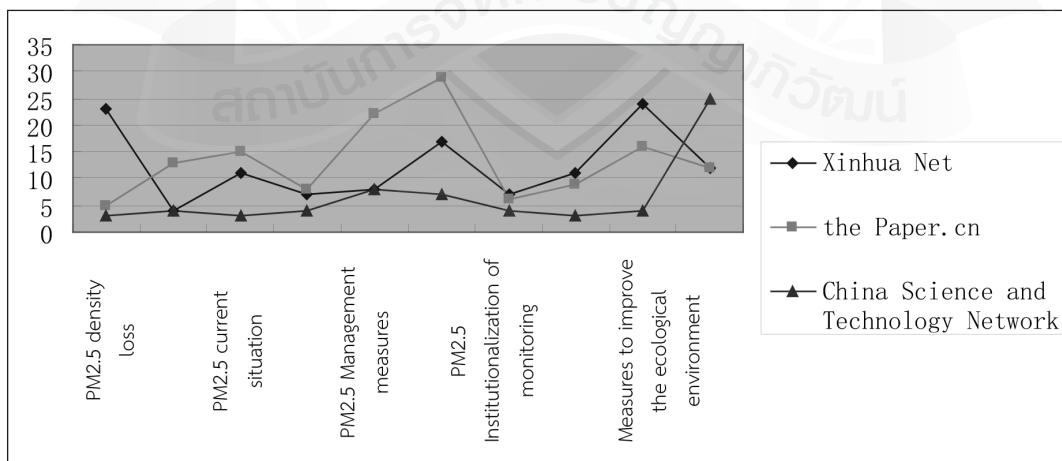
News theme is the main content and core view of news report. This research clearly revealed the angle of news reporting and the presentation of news events. Through the content analysis, three categories of the news theme were discovered: *Event Theme*, *Institution Theme* and *Technology Theme* (Table 1).

1.1 Differences in themes: there were significant differences among different types of media in the topic selection of PM2.5 reports

Through comparison, there were very obvious differences in the setting of reporting themes among the three media, which reflected different definitions and interpretations of PM2.5 issue, as shown in Figure 1.

Table 1 Media coverage theme of PM2.5 issue

Theme	Coverage	Description
Event	(1) PM2.5 density loss	Describe the decrease of PM2.5 concentration and the improvement of air quality
	(2) PM2.5 concentration increase	Describe the increase of PM2.5 concentration and the air quality is extremely bad
	(3) PM2.5 current situation	Describe the average PM2.5 concentration and measure the air quality
	(4) PM2.5 harm to human body	Describe the troubles of PM2.5 on human health and daily life
	(5) PM2.5 management measures	Describe self-protection of the public
Institution	(1) PM2.5 test data disclosure	Report on PM2.5 detection data
Technology	(2) PM2.5 institutionalization of monitoring	Incorporate PM2.5 into the testing system and formulate detailed standards
	(3) Public participation in PM2.5 monitoring	Public participation in PM2.5 monitoring has played a role
	(4) Measures to improve the ecological environment	The government and the public take action to improve air quality
	(5) PM2.5 detection	PM2.5 technical methods of testing

**Figure 1** The distribution of the reporting themes of the three websites

In Figure 1, 0-35 represented the number of reports about different themes on three news websites. The reports of The Papers.cn mainly focused on *Event Theme* (63 pieces) and *Institution Theme* (60 pieces), of which 13 reports took an attention on *PM2.5 concentration increase* and it was the largest number among the three websites. It took the way of asking government to cross-examine and calling on the government to focus on PM2.5 governance problems that existed in the process. At the same time, The Papers.cn paid close attention to *PM2.5 management measures* and *PM2.5 test data disclosure*, which reflected the political appeal for information disclosure, transparency and rapid action of the government.

Xinhua Net mainly focused on *Institution Theme* (59 pieces), emphasizing some cities which *PM2.5 density loss* or apparently decreased, such as Ji Ning city in Shan Dong Province. *PM2.5 density loss* in Beijing was mainly reported. Meanwhile, the harm caused by PM2.5 was little discussed, of which 8 pieces focused on *Measures to improve the ecological environment*, reflecting the continuous improvement of the system and the obvious effects on environmental improvement.

China Science and Technology Network had 65 pieces of reports and the three themes were distributed in average, focusing on PM2.5 in science from the angle of science and technology, explaining the harm of PM2.5 and scientific detection methods, also calling for the social people from all walks of life to take appropriate preventive measures to strengthen

the self protection.

1.2 Theme changes: PM2.5 issue ranged from the institutionalization of monitoring data to the implementation of the detection system

The theme of media coverage was not fixed, it would change with time. 2017 was the final year of *China's Air Pollution Prevention and Control Action Plan*, which was promulgated on September 10, 2013. Environmental inspectors were sent by environmental protection departments to check environmental protection work across the country. However, it was regrettable that the results had not been satisfactory and there were still many problems, for example, some local officials had been held to account.

Research suggested that the essence of such issues were the government mandatory measures of PM2.5 issue attracted the public attentions. As a result, the dividing line was on December 31, 2017. PM2.5 issue could be divided into two stages: before and after the mandatory measures, which would be called the first stage and the second stage. At the first stage, attention was paid to the rise-fall situation of PM2.5 concentration and the disclosure and institutionalization of test data. At the second stage, attention was paid to the implementation of PM2.5 detection system and the existing problems.

The public had paid close attention to PM2.5 issue, and the three websites also reported on it (Table 2). Media coverage continued after the first stage of the issue, while significant differences between the three websites in

terms of theme selection were found. The Paper.cn highlighted the public position and concerned about how to further solve existing problems in the implementation of policies in the second stage by asking the government. More specifically, how would the government

improve its next work deployment? Xinhua Net and China Science and Technology Network focused on what kind of deployment the government would take? In another word, what efforts were being or had been made by the government?

Table 2 Theme distributions at the first and the second stage

News Websites	The First Stage	The Second Stage
Xinhua Net	92	32
The Paper.cn	104	31
China Science and Technology Network	49	16
Total (pieces)	245	79

In Figure 2, 0-40 indicated the number of reports about different themes across the three websites. Comparing two phases of PM2.5 media coverage, it could be seen that after final year 2017, the report theme of the apparent increase was *PM2.5 density loss*. It meant that the three sites began to return to *Event Theme*

in the second stage, after focusing on *Event Theme* in the first stage. However, the results of *Action Plan* from 2013 to 2017 had been confirmed, which had been strongly illustrated with facts and responded to both the system theme and the technology theme.

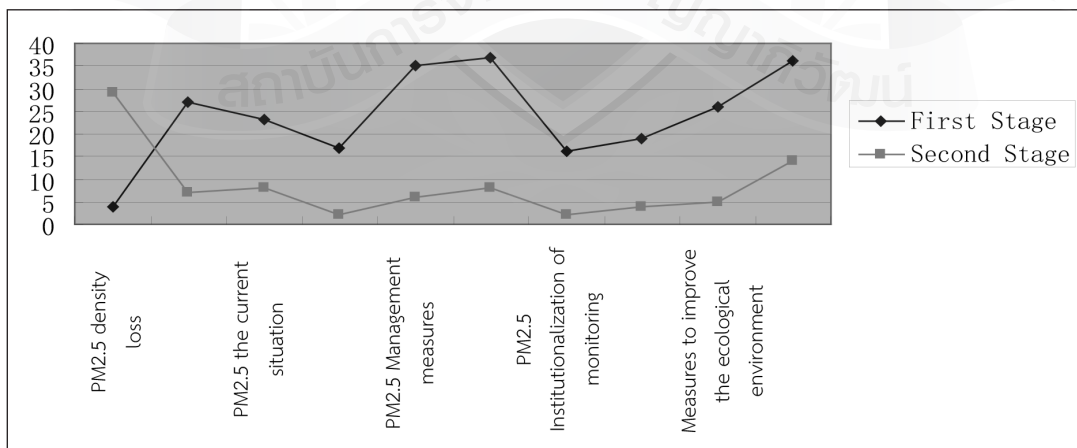


Figure 2 Theme distributions of two stages

2. Sources of Information: Who was the Leader of the PM2.5 Frame?

Sources of information can play a vast role in the topic construction and it is often used as the main object of content analysis. Gitlin (2003) believed that sources of information provided a fulcrum for journalists to construct news. The authorities were the fulcrum. In fact, they had become the definer of news facts. A source analysis of the three news websites' reports on PM2.5 issue would help to explain the frame definition of this issue. Government officials were the most important framers of PM2.5 issue (40.74%). This was mainly because climate change was included in the government's

agenda. PM2.5 had also become an official issue. Government officials were not only the important participants, but also the main information publishers of PM2.5 issue. The position of environmental organizations and environmentalists was also important (18.21%), including the staff of environmental protection bureaus and air quality inspection centers. There were 23 reports by experts and scholars published by China Science and Technology Network (35.38%), more than one third of the information sources in the website, which fully reflected the professionalism of professional websites (Figure 3).

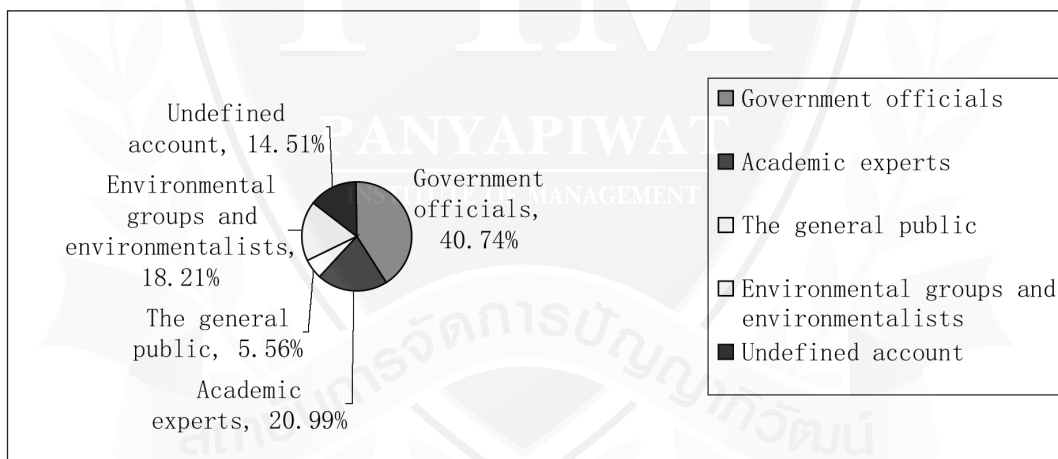


Figure 3 Distributions of various information sources

From the perspective of communication, Xinhua Net focused more on organizational communication, emphasizing the organization work deployment and focusing on what the organization has done. The Paper.cn chose to stand on the position of the public and to release a large amount of news reports with

paying close attention of PM2.5 issue. It attracted wide public attention with its distinctive style of questioning. China Science and Technology Network paid attention to professionalism, highlighting the authority of professional, but references to government officials, environmental groups and sources were low. In other words,

China Science and Technology Network paid not enough attention to the actions of the government and environmental protection agencies in the current climate change process, which reduced the effectiveness of news reports. Although it was a network information communication platform, in essence, it was more like an online class of teaching professional knowledge.

3. Frame comparison: the obvious differences in media reporting discourse of the three websites

Frame is the meaning that people extend through a series of linguistic symbolic messages in a special state of mind, in a bid to observe the basic frame of external things, to analyze and deal with the external world of ever-changing social events (Goffman, 1974).

Frame analysis reflects the value concepts behind news events. In communication activities, the communicator needs to explain the information symbol to the audience. *Frame* belongs to this level of information, which is mainly to explain to the audience how to understand the rules of information symbols. At the same time, different disseminators will formulate different rules to interpret information symbols and provide different frame for audiences. When the audience receives information, they first select the frames and then use them. Therefore, the process by which the audience selects and uses these frames is called *construction*. Pan (2006) mentioned that “construction analysis is a research field, in which researchers can analyze the communication in social contacts,

in a bid to provide a dynamic overall mentality for thinking, speaking and acting.”

The study further divides the *frame* into five forms:

(1) *Event Definition Frame*: mainly refers to three categories. One is the decrease of PM2.5 concentration, the other is the rise of PM2.5 concentration, and the third is the comparison of PM2.5 concentration between different cities.

(2) *Causal Interpretation Frame*: explain the specific reasons for the increase or decrease of PM2.5 concentration.

(3) *Moral Legal Frame*: analyze the problems in PM2.5 governance from the perspective of moral rule of law. For example, *the Commission for Discipline Inspection* conducts interviews and even accountability interviews with local leaders who have failed to control air pollution effectively, and rewards areas that have achieved significant results. For another example, people and government maintains highly consistent attitude on the PM2.5 management target, but the realities and problems such as straw burning and paper money burning results in the dialogue and debate between them.

(4) *Countermeasures and Suggestions Frame*: what measures should the public and the government take to resist the harm of PM2.5?

(5) *Scientific Knowledge Frame*: experts' introduction to PM2.5 related knowledge and the latest inventions in the field of science and technology.

In Figure 4, 0-30 represented the usage frequency of the three websites about different frames. This study found that Xinhua Net was

obviously higher than The Paper.cn and China Science and Technology Network in the frame of *Event Definition Frame*, *Causal Interpretation Frame* and *Countermeasures and Suggestions Frame*. In *Event Definition Frame*, Xinhua Net used 28 times, accounting for the January 1, 2018 to June 1, 75.68% of all reports, significantly higher than The Paper.cn 16 times (51.61%) and China Science and Technology Network 10 times (62.50%). In *Moral Legal Frame*, The Paper.cn used twice (12.50%), while both of Xinhua Net and China Science and Technology Network were missing this category. In *Scientific Knowledge Frame*, The Paper.cn used 9 times (29.03%), significantly higher than Xinhua Net (2.70%) and China Science and Technology Network (25%).

Xinhua Net was a national key news website, which tended to report on the efforts of the government in haze control and the measures it would take, focusing on the *Government Measures*. As a market-oriented media, The Paper.cn was inclined to the general public. On the one hand, it was keen to ask about the government and keep tracking and reporting the changes of PM2.5 in China, hoping the government to continue improving measures. On the other hand, it was keen to answer questions from the general public about the existence of PM2.5.

In the use of *Countermeasures and Suggestions Frame*, it was not obvious among the three

websites, but there was a clear sequencing of the media attention. Xinhua Net took attention first, reported on February 2, 2018. The Paper.cn and China Science and Technology Network took attention later, reports appeared in March 2, 2018 and April 23, 2018. Xinhua Net concerned about governance measures of the government, such as PM2.5 assessment would be carried out in villages and towns, strengthening the assessment of PM2.5 in townships and towns, and those who failed to control air pollution would be given administrative punishment (February 2, 2018). The Paper.cn focused on the advice of experts and scholars, such as constructing a new regional air control system with science and technology as the core (March 2, 2018). China Science and Technology Network concerned the atmospheric pollution source analysis. Reporting that motor vehicle exhaust accounted for 16% of PM2.5 pollution, it was recommended that electric buses and electric taxis be used in a bid to reduce urban air pollution (April 23, 2018).

Thus, it can be seen that media bias is implied behind the frame's use. Xinhua Net's frame emphasizes *Government Measures* and appeals to *Administrative Management*. The Paper.cn embodies the *Daily Life* and appeals to *Public Expectations*. China Science and Technology Network focuses on *Expert Advice* and appeals to *Scientific Governance*.

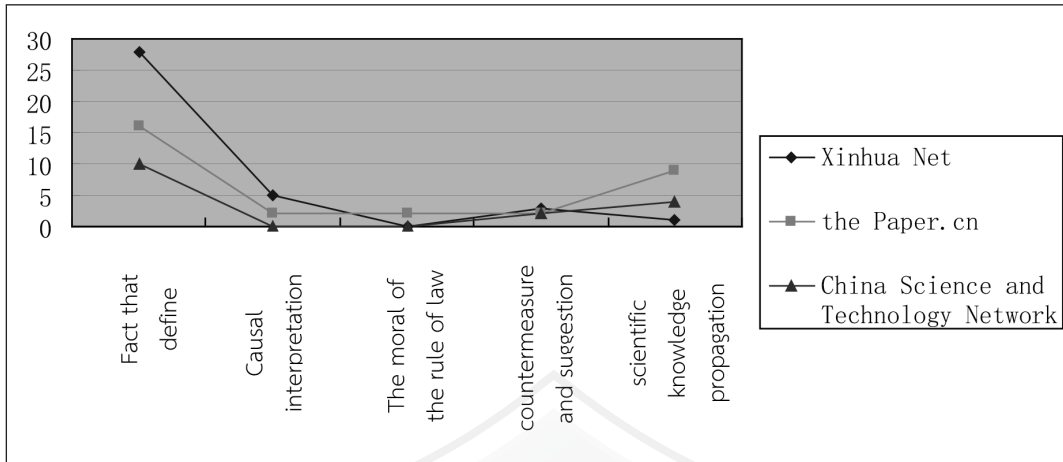


Figure 4 Frame distributions of the three websites on the second stage

Summary of Figures 1, 2, and 4 as shown in Figure 5, 0-160 represented the frequency of three website theme frames. Tendency of frames construction on three websites was basically similar. First, in terms of the number of reporting themes, The Paper.cn had a comparative advantage. Second, from the frame of time, Xinhua Net is the fastest among the three websites. Third, all three websites attached great importance to *Event Definition Frame*.

In fact, Xinhua Net’s frames emphasized *National Policies and Guidelines* and appealed to *Administrative Management*. The Paper.cn and China Science and Technology Network, which embodied *Public Daily Life*, resorted to *Science and Technology Governance*. That is to say, media construction trend of themes and frames might obscure the media’s reporting bias.

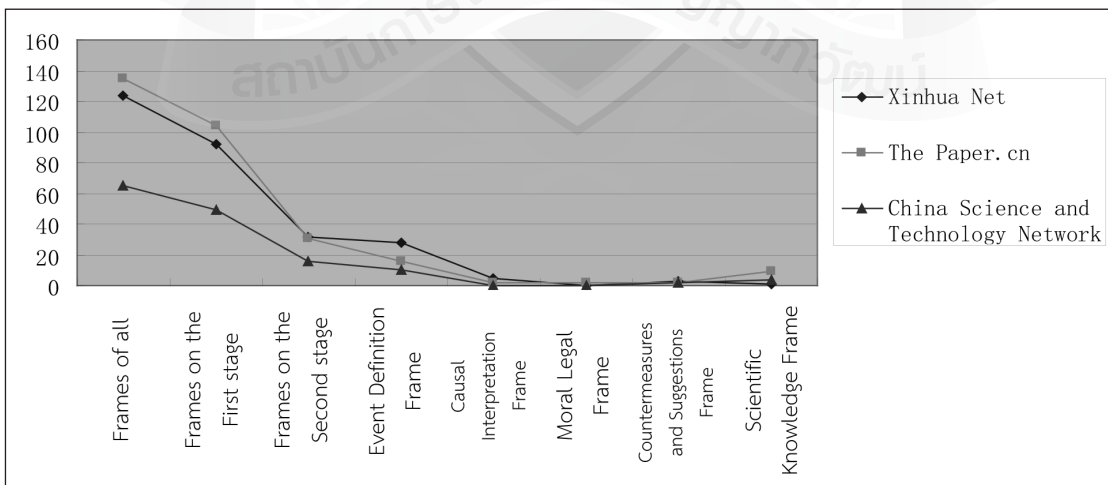


Figure 5 Frames of the three websites

4. Process analysis of frame leading, resonance and diffusion of PM2.5 issue

This study discussed how different types of websites resonated with each other about PM2.5 issue, which meant that a collective, intense media focusing on an issue in a specific period of time. Some of the reporting frames were relatively close. Look carefully at the line of inflection that resonated with the issue, following the peak valley forms. At the peak of the issue, the three websites chose a relatively close reporting frame together and cited similar sources of information, thus increased the number of reports and presented a peak of reports. At this peak, various websites joined the reporting team. In most cases, Xinhua Net inevitably was the initiator and the framer on PM2.5 issue. In this way, various types of media

followed suit, and the reporting frame would be widely spread. As PM2.5 went into recession, media and public attention was also waned, but most media continued to pay attention.

As based on the coding method adopted by Zeng, Dai & Zheng (2013) in a bid to study whether there was frame resonance between the three websites. The period from January 1, 2018 to June 1, 2018 (i.e. the second stage) was selected, indeed, encoded the release date, such as January 1=1, January 2=2, January 3=3 Similarly, the higher the time value was, the later the frame appeared, while the smaller the time value was, the earlier the frame appeared. Zero meant that it did not appear. On this basis, the time average was calculated.

Table 3 Average time of each media reporting frame

Frame	Xinhua Net (N=124) Mean	The Paper.cn (N=135) Mean	China Science and Technology Network (N=65) Mean
(1) Event Definition Frame	31.52	150.24	87.50
(2) Causal Interpretation Frame	27.20	98.50	0.00
(3) Moral Legal Frame	0.00	82.50	0.00
(4) Countermeasures and Suggestions Frame	38.67	99.00	113.50
(5) Scientific Knowledge Frame	40.00	22.56	126.50

The time sequence of the five reporting frames appearing across the three websites was significantly different (Table 3). Xinhua's reporting frame of the *Event Definition Frame*, *Causal*

Interpretation Frame, *Countermeasures and Suggestions Frame* are significantly earlier than that of The Paper.cn and China Science and Technology Network. From this perspective,

it can be said that the application of these three reporting frames originated from Xinhua Net, while The Paper.cn and China Science and Technology Network following up the reporting, there are also significant time differences between them in the frame application. In terms of the application of four frames, including *Causal Interpretation Frame*, *Moral Legal Frame*, *Countermeasures and Suggestions Frame*, *Scientific Knowledge Frame*, The Paper.cn is obviously prior to China Science and Technology Network. The Paper.cn is the only media that uses *Moral Legal Frame*, and it is the only one that fully uses the five frames among the three websites. At the same time, the two frames of *Causal Interpretation Frame* and *Moral Legal Frame* of China Science and Technology Network are blank and missing, and the *Scientific Knowledge Frame* appears very late. It can be said that Xinhua Net is the framer and leader of the frame. The Paper.cn has promoted the resonance of the frame, and China Science and

Technology Network has followed up in the process of frame diffusion.

The calculation method of *Frame Saliency* was adopted in a bid to analyze the correlation between the three websites. For example, in the second stage, Xinhua Net's *Event Definition Frame* appeared 28 times. At the same time, the total number of frames in this stage was 37.

$$28 \div 37 = 0.7567$$

Then, 0.7567 multiply by 100%, got 75.67. So the saliency of *Event Definition Frame* in the second stage of Xinhua Net was 75.67 (Table 4).

By analogy, the saliency of the three websites in the second stage about the five frames is obtained. Finally, $P=0.000462$ was obtained by Pearson correlation coefficient test. This shows that there is a significant correlation among the three websites in the application of *Causal Interpretation Frame*, *Moral Legal Frame*, *Countermeasures and Suggestions Frame* (Table 5).

Table 4 Frequency of frames appearance on three websites

	Xinhua Net	The Paper.cn	China Science and Technology Network
(1) Event Definition Frame	28	16	10
(2) Causal Interpretation Frame	5	2	0
(3) Moral Legal Frame	0	2	0
(4) Countermeasures and Suggestions	3	2	2
(5) Frame Scientific Knowledge Frame	1	9	4

In the process of calculating frames Saliency, the total number of frames in the second stage of Xinhua Net was 37. The total number of frames in the second stage of The Paper.cn

was 31. The total number of frames in the second stage of China Science and Technology was 16.

Table 5 Frame saliency of the three websites

Frame	Xinhua Net (N=124) Mean	The Paper.cn (N=135) Mean	China Science and Technology Network (N=65) Mean
(1) Event Definition Frame	75.67	51.61	62.5
(2) Causal Interpretation Frame	13.51	6.45	0
(3) Moral Legal Frame	0	6.45	0
(4) Countermeasures and Suggestions Frame	8.11	6.45	12.5
(5) Scientific Knowledge Frame	2.7	29.03	25

Conclusion and Recommendations

Climate change has become an issue of universal concern across national borders, particularly in developing countries. The country needs not only to develop the economy, but also to protect the ecological balance. The research is to further explore how different types of news websites compete for frames under the background that environmental issues are constantly highlighted.

According to the analysis, PM2.5 had become a common topic of concern between officials and the public, but there were different concerns. Xinhua Net was in the national position of the country, emphasizing the official policy and continuous efforts of the government. It used a large number of government officials as the source of information and tended to be

National Policy. As the representative of the marketization website, The Paper.cn dense coverage of PM2.5 issue presented a large number of ordinary citizens as sources of information, highlighting the *Moral Rule of Law*. China Science and Technology Network focuses on publishing information sources of experts and scholars, highlighting professionalism and showing *Scientific Governance*.

The three websites had the mechanism of framing guidance, resonance and diffusion of PM2.5 issue report. In the application of multiple frames, Xinhua Net was the framer, while both The Paper.cn and China Science and Technology Network were frame followers. In this process, The Paper.cn constantly expanded and enriched the frame, and its reports were also the most frequent and intensive of all, thus promoting

frame resonance more vigorously. In contrast, the application of the frame of China science and technology network often appeared in the diffusion stage of the frame, which reflected the lagging response of professional websites in the follow-up process of the topic frame.

The research discussed the formulation, guidance, resonance and diffusion of PM2.5 issue frame, introducing the discourse construction factor into the study of text, and responded to frame theory researchers' call for a frame analysis of *Bridge Model*. Imagining that the frame seems as a bridge between news discourse and the world in a bid to help us observe the world. The whole social order is clearly seen in it, including complex institutional structures, economic relations and other important facts (Sparks, 1992).

Finally, some Suggestions on new media coverage of PM2.5 issue are proposed. When new media reports PM2.5 issues, they need to set various themes and draw up frames from different perspectives to make the content attractive. New media should follow the peak and valley effect, actively report the issues that are closely concerned to the audience, and realize the linkage among numerous media

to form a strong report by promoting the emergence of the peak of reporting. The media of different camps need to exert their own advantages in a bid to effectively achieve the frame diffusion, thus making the coverage of issues have a strong influence. In order to achieve this goal, the official media should continue to maintain the status advantages of the frame leader, firmly grasp the power of information release and information source, and provide important information to the public in a timely manner. Market media needs to constantly enrich and expand the reporting frame and promote the generation of frame resonance. Industry media should follow up closely in the frame diffusion stage, highlight professionalism and meet the audience's demands for information in various aspects.

Acknowledgement

This paper emerged from the support of Mahidol University, Thailand under the Scholarship for International Visiting Professors or Scholars to Work at the University in the Fiscal Year 2018. The authors would also like to thank the reviewers for their invaluable comments to improve this manuscript.

References

- Bao, Y. (2012). Study on the New Characters of Environmental News Reporting: Taking the PM2.5 Reports of Liberation Daily as an Example. *Today's Media*, 8, 38-39. [in Chinese]
- Bourdieu, P. (1991). *Language and Symbolic Power*. Cambridge, Mass: Harvard University Press.
- de Vreese, C. H. (2005). News framing: Theory and typology. *Information Design Journal + Document Design*, 13(1), 51-62.
- Dispensa, J. M. & Brulle, R. J. (2003). Media's Social Construction of Environmental Issues: Focus on Global Warming- A Comparative Study. *The International Journal of Sociology and Social Policy*, 23(10), 74-105.
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51-58.
- Entman, R. M. (2007). Framing Bias: Media in the Distribution of Power. *Journal of Communication*, 57, 163-173.
- Gitlin, T. (2003). *Media Unlimited: How the Torrent of Images and Sounds Overwhelms Our Lives*. New York: Henry Holt and Company.
- Goffman, E. (1974). *Framing Analysis: An essay on the Organization of Experience*. Philadelphia: University of Pennsylvania Press.
- Jin, P. (2014). Daily Environmental Struggle in Social Media: Taking the Construction of New PM2.5 Protest Plays as an Example. *Journal of Anhui University*, 4, 151-156. [in Chinese]
- Liu, T. (2017). PM2.5, Knowledge Production and Hierarchical Criticism of Ideographs: a Rhetorical Approach to the Study of the History of Ideas. *International Press*, 39(6), 63-86. [in Chinese]
- Pan, Z. D. (2006). Structural Analysis: a Field in Need of Theoretical Clarification. *Journal of Communication and Society*, 1, 17-46. [in Chinese]
- Semetko, H. A. & Valkenburg, P. M. (2000). Framing European politics: A content analysis of press and television news. *Journal of Communication*, 50(2), 93-109.
- Sparks, C. (1992). Popular Journalism: Theories and Practice. In Peter Dahlgren and Colin Sparks. (Eds.). *Journalism and Popular Culture*. London: Sage.
- Wu, M. (2014). *Media Construction Research on Environmental Issues*. The Doctoral Dissertation, Zhengzhou University. [in Chinese]
- Xu, J. H. (2012). Online News Reports of Air Quality Issues in Beijing. *Telematics and Infronatics*, 29, 409-417. [in Chinese]
- Zeng, F., Dai, J. & Zheng, J. (2013). Frames Contest, Resonance and Diffusion: An Analysis on News Coverage of PM2.5 Issue. *International Press*, 35(8), 96-108. [in Chinese]
- Zhuang, J. (2014). Media Presentation of Haze Reports: Taking People's Daily, Southern Metropolis Daily and New Century as Examples. *Journal of Graduate Students of Central China Normal University*, 12, 122-124. [in Chinese]



Name and Surname: He Man

Highest Education: Ph.D. Communication University of China, Beijing

University or Agency: School of Journalism and Communication, Hebei University

Field of Expertise: Environmental Communication, New Media and Culture

Address: School of Journalism and Communication, Hebei University, P.R. China, No. 2666 Qiyi East Rd., North District, Baoding, Hebei Province, P.R. China 071000



Name and Surname: Sukanya Sereenonchai

Highest Education: Ph.D. Communication University of China, Beijing

University or Agency: Faculty of Environment and Resource Studies, Mahidol University

Field of Expertise: Environmental Communication, Communication for Development and Social Change

Address: Faculty of Environment and Resource Studies, Mahidol University, Phuttamonthon 4 Rd., Salaya, Nakhon Pathom 73170

INSTITUTE OF MANAGEMENT

สถาบันการจัดการปัญญาภิวัตน์