

Summer 6-30-2018

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## Recommended Citation

Li, Yuanheng; Tu, Yan; and Li, Xuefeng, "Study on Enterprises' Internet Public Opinion Area Hotspots Based on Social Network Analysis" (2018). *WHICEB 2018 Proceedings*. 68.

<http://aisel.aisnet.org/whiceb2018/68>

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# Study on Enterprises' Internet Public Opinion Area Hotspots Based on Social Network Analysis

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**Abstract:** With the rapid development of Web 2.0, online public opinion has become an issue in the companies' development process. With numerous user-generated contents about real-world events generated almost in real-time, monitoring, evolution and management of online public opinion play the critical role for the healthy development of enterprises. By collecting articles about public opinion on the corporate network from CNKI and using Citespace based on social network analysis, we have combed the context of current research in this area, analyzed the characteristics of the current research on this topic, excavated research rules in this field and summarized research results to provide references for further study.

Keywords: enterprise, online public opinion, bibliometric analysis, visualization, Social Network Analysis

## INTRODUCTION

With the further popularization of the internet, many social web tools, such as BBS, blog, microblog and WeChat, gradually become the important access for internet users to communicate with each other, express views, elicits emotions and share tips. Consumers can express their opinions on all kinds of services and products through variety of social tools. And relevant topics will be disseminated at an extremely rapid rate in the network, thereby continuously attracting new groups to join, forming public opinions in eventually, which will bring unprecedented pressure to the development of enterprises. In addition, the media coverage will also form a strong public opinion that has strong influence on the internet. The opening, interactivity and vitality of the internet have promoted the public opinion events to have a wider influence, spread faster and have more destructive power. In the ever-changing network environment of public opinion, commenting on the online public opinion correctly, carrying out real-time monitoring of online public opinion, guiding the development of the public opinion crisis effectively and eventually deal with online opinion crises successfully, have a great significance of the reputation and health development of enterprises. Dellarocas (2007) argues that online remarks from online users are an important source of information for businesses in making decisions and he suggest that businesses can predict product sales by analyzing online reviews[1].

The study of public opinion in our country began in 2003, of which the research on internet public opinion began in 2008. At present, although scholars have conducted many explorations and researches on the spread of online public opinions, monitoring and early warning as well as guiding and coping with online public opinion, there is still a lack of depth in research and organic combination among various research subjects.

By utilizing Citespace, doing the bibliometric analysis and combing the current research of online public opinion, the paper can sum up the law and direction of the study, further grasp the research status, academic hot spots and the development trend of online public opinion, understand the research structure of the enterprise online public opinion deeply and then explore its research dimensions and theoretical basis systematically, which can provide some reference for the exploration of the theory and method of network virtual social management.

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## 1. SAMPLE AND DATA COLLECTION

In the CNKI Chinese Academic Literature Network Publishing Database (99.9% acceptance rate), the paper use “enterprise” and “public opinion” as the key words and the periodical range is "all journals" so that 1021 articles are obtained. In the meanwhile, in order to ensure the accuracy and credibility of the research result, and to avoid the interference of unrelated documents, we first screen out some irrelevant documents such as "meeting reports", and then exclude the documents without keywords. Eventually, 453 articles meet the requirement.

## 2. MEASUREMENT

Co-Word Analysis is a content analysis technique<sup>[2]</sup>, which mainly analyzes the number of occurrences of a pair of words (enterprise, network public opinion, monitoring and early warning, guidance, etc.) in the same literature in the study of enterprise online public opinion. Based on this, doing the hierarchical clustering of these words can reveal the close relationship between these words and then analyze the structural changes of the subject and topic. Co-word analysis is an important method of information metrology. It is generally believed that the intensity of the relationship between the two topics is proportional to the number of times the representative topic's vocabulary appears in the same document. The higher the frequency, the closer the relationship between the two topics. What's more, scholars are more concerned with the research topic and the subject is usually the hot topics of the subject. The scientific knowledge map based on co-occurrence network analysis can not only explore the evolution of the field, but also visualize the research in this field<sup>[3]</sup>.

The map of scientific knowledge is an image that takes knowledge domain as the research object and shows the relationship between the development process and structure of a certain scientific knowledge. It has the double nature and characteristics of "graph" and "spectrum", showing the cross, interaction and evolution between knowledge elements and other complex relationships<sup>[4]</sup>.

## 3. RESULTS

### 3.1 Hot spot of research

The keywords can highly summarize papers, which can reflect the key contents of the research results. In this paper, we delete the non-standard key words and merge synonym in order to ensure the effect of common-word analysis. And ultimately, we get 32 keywords whose frequency is more than 7. Table 1 is the top 32 high-frequency keywords in the research field of corporate network public opinion. Through these keywords, we can characterize the hot spots in the research field of corporate network public opinion to a certain extent. The keyword in this field is “online public opinion”, whose frequency is 191. In addition, “public opinion information”, “new media age”, “crisis public relations”.

**Table 1. High frequency keyword list**

Serial number	Keyword	Frequency	Serial number	Keyword	Frequency
1	Online public opinion	191	17	First time	12
2	Public opinion information	39	18	Social public opinion	12
3	Public opinion	32	19	measure	11
4	New media age	31	20	New Media Environments	11
5	Public opinion analysis	30	21	Big data	10
6	Reputation risk	23	22	Food safety	10
7	Crisis public opinion	23	23	People's Network	10

8	Opinion leader	22	24	Public opinion monitoring	10
9	State-owned enterprises	21	25	Sinopec	8
10	Crisis management	19	26	Reputation management	8
11	self-media	18	27	Monitoring room	8
12	enterprise	17	28	Public opinion monitoring	7
13	Power Enterprise	15	29	Financial Institutions	7
14	new media	13	30	News spokesman	7
15	Corporate image	12	31	Negative information	7
16	hot-spot event	12	32	management	7

### 3.2 Key words co-occurrence knowledge map

In order to draw keywords co-occurrence map, the paper imports data into Citespace for format conversion and storage, and the node type is selected as "keyword". In addition, the top50 nodes in each time zone are selected, that is, the threshold it top50 and the time slice is set to 2 years. Last, the routing algorithm is used to draw keywords co-occurrence map. As shown in Figure 2, there are 189 nodes and 529 connections in the graph. Since "network public opinion" is the subject of retrieval, a total of 191 times occur. The node is too large to cover the entire network so that we delete the "online public opinion" to make the map clear and reasonable.



Figure 1. Key words co-occurrence knowledge map

By analyzing the frequency and occurrence time of high-frequency keywords, the time lines and hot spots in the field can be judged. The size and color change of the circle shows the importance of a node. The larger the circle is, the larger the number of times the keyword appears. The more vivid of the node color, the later it appears. When a node's intermediary center is large, a purple circle appears. If a node is at the core of the field, it will control the flow of information. The connection indicates the degree of association of the node with other nodes[5]. Integrated node frequency, centrality and relevance, the paper list 10 key nodes which have higher impact in the field of enterprise online public opinion: online public opinion (191,0.49), public opinion information (39,0.14), public opinion (32,0.16), new media age (31,0.07), public opinion analysis (30,0.01), reputation crisis (23,0.10), crisis public relationship (23,0.14), opinion leader (22,0.20), crisis management

(19,0.23), power enterprise (15,0.15). At the stage of generating atlas, there are interaction forces between nodes, and nodes with higher influence can attract the remaining nodes in the vicinity to connect with each other according to the degree of connection with each other, so as to form a common knowledge map of key words and visualize the research direction on enterprise online public opinion.

### 3.3 Hotspot topic classification



Figure 2. Key words cluster knowledge map

According to the key word co-occurrence knowledge map and cluster time chart analysis, we can divide the hot topics in the study of corporate network public opinion in China into “the online public opinion propagation and monitoring under the new media era (# 2, # 3, # 9)”, “online public opinion guidance and crisis management (# 1, # 5, # 6, # 8)”, “financial industry online public opinion discussion (# 4, # 7)”, “food industry online public opinion discussion (# 0)”.

#### 3.3.1 Online public opinion propagation and monitoring under the new media era

In this part, the paper mainly analysis characteristics and modes of dissemination of corporate network public opinion so as to carry out public opinion monitoring, timely warning. This section includes cluster #2, #3, #9. In the era of web2.0, the dissemination of public opinion has become more extensive, public participation has become more popular, and the scope of dissemination has become broader. Under the new media environment, the rules of corporate crisis dissemination begin to appear "long tail effect". In addition, the stakeholders in the corporate crisis have deepened their mutual cooperation under the new media, resulting in the extension of corporate crisis dissemination process. To improve the ability to guide the public opinion crisis, enterprises need to have a comprehensive understanding of the mode and characteristics of the spread of online public opinion under the new channel of communication environment. For different industries, different public opinion monitoring and early warning systems can be set up: early warning system of network public opinion crisis based on viewpoint tree; design and application of on-line intelligent monitoring system of network public opinion network for power enterprises and research and implementation of public opinion mining system of listed companies based on Hadoop<sup>[6]</sup>. In the daily time, what we need to do is just as list: ① Enhance the awareness of public opinion management and awareness of crisis; ②Real-time monitoring,

intelligent data collection and timely analysis of the results of the monitoring; ③Continuously improve the internal information database and internal public opinion monitoring system; ④Establish public opinion monitoring work process and system. Lin Qin and Guo Dongqiang (2017) did a research. Based on the characteristics of communication subjects, according to the principle of system dynamics, this research made sensitivity analysis and comparative analysis about the four factors to put forward the countermeasures to prevent and control the dissemination of enterprise network public opinion<sup>[7]</sup>. Business emergencies are events that spread widely among the public and spread negative information associated with dangerous or defective products<sup>[8]</sup>. Wang et al. (2014) found that diffusion period, immune period, brand reliance remodeling period, together with the structure of the public social network all had a great impact on the outburst threshold value, maximum of the diffusion, stability level, and fluctuation of public opinion<sup>[9]</sup>.

### 3.3.2 Guidance of enterprise online public opinion and management of public opinion crisis

In this part, this paper mainly analysis that how to effectively guide enterprises online public opinion and deal with public opinion crisis, minimize the public opinion on the business losses. This section includes clusters #1, #5, #6, #8. The essence of corporate crisis is not a matter of product attributes, nor is the incident itself, but the public's trust in the reputation of the company, related products, and the overall business<sup>[10]</sup>. To effectively guide and control the network public opinion crisis in different industries, unnecessary losses can disappear intangible. What we need to do is: ①Improve the public opinion monitoring system, have an access to accurate sources of information, improve monitoring methods, judge public sentiment and emotional attitudes accurately so as to establish a more realistic monitoring system<sup>[11]</sup>; ②Public opinion evaluation techniques. It need to integrate computer technology and literary knowledge to accurately find out the real situation of public opinion so as to predict future public opinion scientifically; ③We should properly handle the relationship between deterring rumors and freedom of opinion, and advocate the combination of online media literacy and legal supervision of public opinion so as to create an open and effective public opinion environment. ④We should do some in-depth study on generation, dissemination and guidance about online public opinion from multidisciplinary perspectives to promote the development of Chinese independent network security and train some high-level network supervisors to meet the government and public demand.

### 3.3.3 Online public Opinion on Financial Industry

In this part, the paper mainly discusses public opinion monitoring, prevention and control theory, reputation risk in financial industry. This section includes clusters # 4, # 7. The emergence and evolution of the related public opinion in the financial industry will have an important influence on the financial industry and even the macroeconomic operation. That's why financial should be distinguished with other industries deserving special attention. At present, the main objects of the research on internet public opinion in the financial industry include traditional commercial financial institutions and internet financial institutions, among which traditional commercial financial institutions include rural small and medium financial institutions, city commercial banks and large joint-stock banks; And internet financial institutions include P2P institutions, third-party payment Agencies and so on. In order to strengthen reputation risk management, we need to do: ①Emphasize the overall management of reputation risks; ②Do a good job in preventing public opinion risks; ③Improve the coping skills of financial institutions; ④Strengthen positive publicity efforts;

The characteristics of internet financial events include rapid spread of internet and confidential privacy of the financial industry features. Compared with the common public opinion, the public opinion of the Internet financial industry is especially difficult to control due to its intricacy. The public opinion in this area has the following characteristics: ①It's difficult to deal; ②It has many participants; ③Long duration. In view of the management of the public opinion crisis in Internet finance industry. Tan Yunming and Rao Xiao (2015) found that online financial public opinion has four reasons and they also believed that the network financial public

opinion process include information collection, quantitative analysis and early warning of crisis. And they put forward measures to strengthen the sense of crisis, strengthen the organization and leadership, be familiar with the formation and propagation of public opinion<sup>[12]</sup>.

### 3.3.4 Online public opinion on food industry

In this part, the paper mainly discusses the components, dissemination, response and management in the food industry. This section includes clusters #0. The development of online public opinion in food industry events are divided into four phases: sprout, sudden, development and blowout<sup>[13]</sup>, and it happens with public participation, mobilization of opinion leaders, media agenda setting, enterprise response strategy, government, Industry organizations involved. So the public opinion characteristics of the industry include: ①The industry receives a high degree of attention; ②Negative news usually starts in the social network; ③The time and scale of the outbreak are unpredictable; ④It has a long duration and a topic repeatedly discussed. Liu Bowei and Zeng Runxi (2017) pointed out that the components of public opinion on food safety network consists of some main elements like government, enterprises, internet users, food inspection agencies, non-governmental organizations (food experts etc.), the media (platforms such as traditional media, new media and social forums) and some object elements as well as public opinion. What's more, it also includes some elements like mobile phones, Weibo, opinion leaders, social networking sites, specialized forums<sup>[14]</sup>. Gao Kuo and Zhu Guiguang (2017) pointed out that with the passage of time, the different phases of the public opinion communication in the food industry show different characteristics. Netizens' behaviors are also influenced by the spiral effect of silence, the Matthew Effect and present an integration trend.

## 3.4 Research frontier analysis

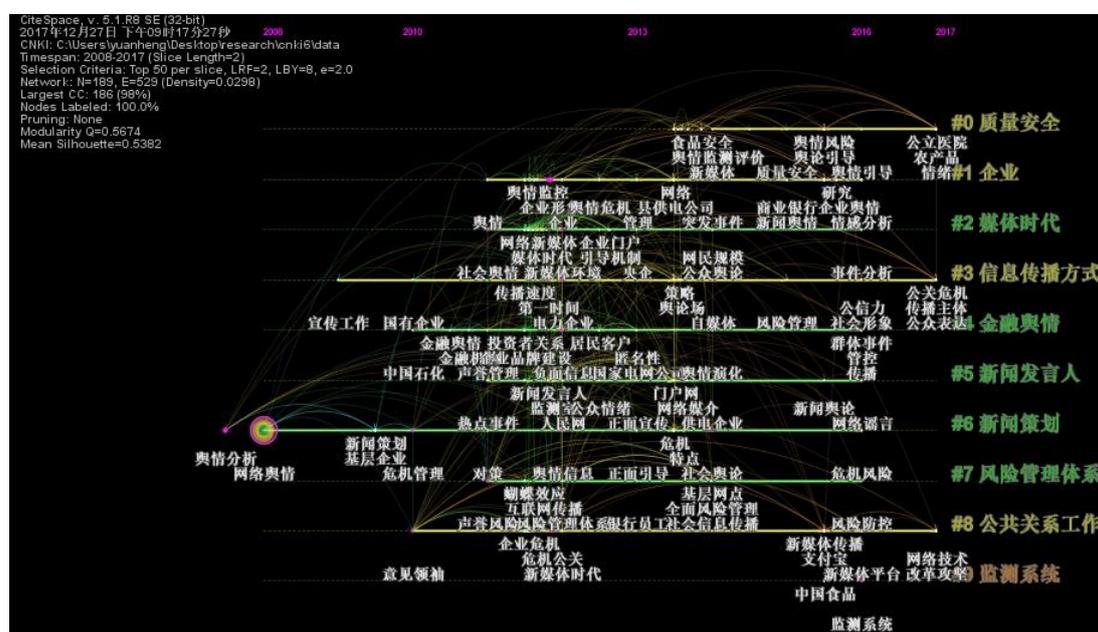


Figure 3. Corporate network public opinion research timeline map

As we can see from Figure 4, corporate network public opinion began in 2008. From 2008 to 2010, it is the initial stage of research on public opinion of enterprises. The research mainly focuses on state-owned enterprises and news planning. From 2011-2013, it is the outbreak time of online public opinion for the corporate. The research involves monitoring, dissemination, guidance, management, in addition to public sentiment, reputation risk. Research continued to be deepened from 2013 to 2016, adding more researches on

food safety, internet users' sentiment analysis and internet financial public opinion in the new media environment. The research directions include corporate public relationship crisis, farm products, and analysis of internet users' sentiment from 2016 to 2017.

Citespace can identify burst words by calculating the rate of change of frequency so that the research frontier can be explored. Burst words reflect the word frequency changes in a period of time greatly, we can find the forefront of research in this area. As shown in the figure below, the top three burst words detected by the burst term function in Citespace are crisis management (intensity 3.73,2010-2012), financial institutions (intensity 2.56,2011-2013), food safety (intensity 2.99,2015 -2017).

### Top 3 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2008 - 2017
危机管理	2008	3.7306	2010	2012	
金融机构	2008	2.5649	2011	2013	
食品安全	2008	2.9851	2015	2017	

Figure 4. Burst words and parameters of enterprise online public opinion

We can find that the hot spot research is “food safety” from the figure above. Public opinion on food safety network is both an important platform for the public to participate in the management of food safety and a risk factor for social stability. The industry and academia conduct research on food safety public opinion from different angles and construct a response path. Research in the field of food safety includes the evolution, monitoring and responses. Zeng Runxi(2017) collected and sorted the researches on internet public opinion of food safety according to the different types of internet public opinion and model; Then he analyzed and summarized some good ideas and strategies suggested in the related researches. Finally, he pointed out the problems of current researches, such as limited consideration of the stakeholders, life cycle research failing to reflect the particularity of food safety public opinion, etc.

#### 4. DISCUSSION

In this paper, 453 essays obtained from CNKI are processed and analyzed by using Citespace, a scientific knowledge mapping tool. By means of visualization, combing the context of current research in this area, analyzing the characteristics of the current research on this topic, excavating research rules in this field so as to summarize research results and provide references for further study.

The study on public opinion of corporate network in our country began in 2008, and the high-frequency key words in the research field are internet public opinion, public opinion information, new media era, public opinion analysis, reputation risk, crisis public relations, opinion leaders, etc. which represent Scholar's research direction to a certain extent. Key words co-occurrence knowledge map and cluster diagram show that the hot topics in public opinion research include: dissemination and monitoring research of public opinion in the new media era, the guidance online public opinion and management of public opinion crisis, financial industry public opinion and food industry network public opinion. Through the study of the hot timeline and burst term, we can find how the research focus changes. At present, the public opinion of enterprises is in a steady development period, and the dissemination, monitoring and guidance of food safety issues under the new media environment have become the current research hotspots.

Although the study of public opinion of the corporate network has develop greatly, there are still some problems: ①At present, the research of the network public opinion mainly focuses on how to govern the public.

Although there are some researches on the monitoring and early warning of the public opinion on the network, it doesn't combine effectively with other aspects of research;②Under the new media environment, we don't apply the big data, deep learning and other scientific method into early warning and guidance of public opinion well; ③Internet finance is a newly emerging field in recent years. The online public opinion in this field is different from other industry. However, the research of theory and practice on the internet financial public opinion are still in a lack, which need further attention.

#### ACKNOWLEDGEMENT

This paper is supported by professor Tu and professor Li giving a lot of specific instructions and help. This paper is sponsored by National Social Science Fund of China “Research on Governance Mechanism of Network Society for Public Safety Incidents” (Project No. No. 14AZD045) and Humanities and Social Sciences of Ministry of Education Planning Fund “Research on the Decision-making Behavior of Investors and Borrowers and Risk Control Strategy in P2P online lending” (Project No. 15YJAZH066). Thank all of them very much.

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